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The Repair and Binding of Old Chinese Books

Translated and Adapted for
Western Conservators

DAVID HELLIWELL

[FROM A MANUAL OF TRADITIONAL RESTORATION TECHNIQUES
BY XIAO ZHENTANG AND DING YU]

Shortly after my appointment to the Bodleian Library in 1976, the value of the collections for which I had assumed responsibility gradually became apparent to me. There were, for example, the Chinese books that had come to the library during the Wanli period (1573–1620) of the Ming (1368–1644), the first being inscribed by Sir Thomas Bodley himself in 1604. By the end of the seventeenth century, there were well over one hundred fascicles, and indeed, it is reckoned that out of all the Chinese books that came to Europe during the seventeenth century, a quarter of those that are extant are probably in the Bodleian Library — a mere three shelves, but including several unique surviving printed editions. As elsewhere in Europe, larger collections were acquired in later centuries as contacts with China became routine, and the most famous, that of Sir Edmund Backhouse, arrived in stages between 1913 and 1922. Although when it was acquired the Backhouse Collection was

one of the finest old Chinese book collections outside the Far East, at the time of my appointment it was still only accessible through the card catalogue that had been produced in a great hurry by Xiang Da, who had worked in Oxford in 1936 on official leave from the National Library of Peiping. The Backhouse Collection was therefore the starting point for my *Catalogue of the Old Chinese Books in the Bodleian Library*, the first two fascicles of which were published in a somewhat rudimentary fashion in 1983 and 1985.

During the course of my work in cataloguing and taking stock of the treasures in my custody, I was particularly struck by their physical condition. Whereas the seventeenth-century acquisitions, in the fashion of their day, had been put into limp vellum bindings with a heavy application of animal glue, those of later times had been left untouched. Furthermore, at a time when most other Western libraries were wrecking the format of their traditional Chinese books by binding them up in Western style, even to the point of rounding the spines, through either profound wisdom or lack of money — I could not say which — the Bodleian bookbinders produced wrap-around cases in imitation of the Chinese *tao*, touchingly provided with rounded backs, so that when stood on the shelves they would look like Western volumes. The Backhouse Collection had arrived in excellent condition with its *tao* for the most part intact, and in this state, mercifully, it was left.

Quite striking was the way in which the Chinese books that had been bound in Western style were now in grave need of attention. It was painful to observe how each time the seventeenth-century fascicles were opened, the solid animal glue and the vellum bindings — no longer limp, but stiff — were pulling apart the fragile text block. But worse, by far, were the volumes that had already been bound before we received them. In many cases, the large number of volumes and the degree of degradation make it unlikely that they will ever be restored to even a usable, let alone original condition. By contrast, the Chinese fascicles (*ce*) that had simply been boxed or tied between boards to provide protection, were for the most part excellently preserved. It was impossible to avoid the conclusion, now increasingly recognized by sympathetic Western conservators, that the Chinese *ce* with its detached protective *tao* is one of the best means ever devised of presenting and preserving written text.

As I contemplated what ought to be done about the books that had been bound in Western style, particularly the seventeenth-century acquisitions, and the books that though in their original bindings were now in need of repair, a manual entitled *The Art of Repairing and Binding Old Chinese Books* (*Zhongguo guji zhuangding xiubu jishu*) by Xiao Zhentang and Ding Yu came to my attention. In my opinion, it is by far the best treatise on the subject that has been produced to date in any language. It was published in Peking by Shumu wenxian chubanshe in 1980, and the fact that fifteen thousand copies were printed is an indication of the extent of the use for which it was designed. According to Ding Yu's preface, the authors began to write the manual at the beginning of 1964, and worked on it sporadically during their leisure time, completing the first draft in November 1965. In 1978, their colleagues suggested that they publish it for the benefit of others working in the same field, so they got out the "dusty manuscript" that they had written over a decade earlier, thoroughly revised it, and removed anything that was not directly related to the actual process of book restoration. When I first saw the work and realized its importance, I immediately decided to translate it, and was encouraged in this as in much else by Professor Piet van der Loon, who warned me nonetheless, and quite rightly, that it would involve far more work than I imagined.

The principal author of the manual was Xiao Zhentang, who in his youth had worked as a book restorer in the Liulichang, the famous street of antiquarian booksellers in the heart of Peking, which even today in its sadly reduced state exerts an irresistible pull on the scholar. There he learned the art of traditional Chinese book restoration, which had reached its apogee during the eighteenth century in the Qianlong (1736–1795) and Jiaqing (1796–1820) periods. Later in life he exercised his art as chief conservator in Peking Library, and was among those who trained the entire present generation of Chinese conservators, who came to Peking from all parts of the country for instruction during the 1950s and 1960s. His pupils included both Du Weisheng, his successor as chief conservator at Peking Library, and Zhao Jiafu, chief conservator at Shanghai Library. He is therefore one of those important figures who have transmitted precious skills from the past to the present at a time when they were in grave danger of being forgotten.

The truth of this became clear to me when I encountered passages in his work that seemed incomprehensible — and it should be borne in mind that I write as an observer, not a practitioner of the art of book restoration. I had been particularly impressed by the way in which many of the finer editions in the Backhouse Collection had been restored, and assumed that Sir Edmund Backhouse had arranged for this work to be done in the Liulichang at the time he purchased them, perhaps even at the time when Xiao Zhentang was serving his apprenticeship. The editions in the Backhouse Collection are still in immaculate condition, and provide us with a corpus of examples of the Chinese art of book restoration whose importance can scarcely be exaggerated. Time after time when it was far from clear to me how the paper should be folded or cut, examination of these volumes provided the answer: the traditional skills of the Liulichang are precisely those that Xiao Zhentang describes in his work.

The gestation period of the translation, like that of the original manual, was long: I worked on it intermittently in my leisure time for exactly ten years. In the final stages of my work, it became apparent that to complete the translation satisfactorily, I would have to visit the workshop where it was originally produced. I therefore went to Peking in October 1987 with the aim of resolving certain passages of the Chinese original that defied my comprehension, and also of obtaining paper and coloring materials. In this connection I acknowledge with gratitude the generosity of the British Academy, which sustained the cost of my visit. Alas, it was not possible to meet Xiao Zhentang, as he had died in 1986 at the age of seventy-seven.

In the restoration workshop of Peking Library, my questions were answered by Du Weisheng, who had been chief conservator there since 1974. With much patience and forbearance, for which I owe him my thanks, he spared time for lengthy interrogations at the very moment his workshop was being dismantled around us and transferred to the new library near Zizhuyuan Park. Evidently some change of attitude to conservation work had taken place since the retirement of Xiao Zhentang, as certain procedures such as disguising repairs so that they are indistinguishable from the original and retracing missing portions of text have now been discontinued in favor of the more modern approach to conservation, which holds that any repair should be both visible and revers-

ible. Accordingly, I therefore deleted from the text one or two passages describing restoration methods clearly designed to "sell books," to quote the words of Mr. Du, so that my translation would conform with current attitudes to conservation in both China and abroad, and would not run the risk of being condemned by purists.

Traditionally, however, great importance was attached to the aesthetic qualities of the Chinese book, so that any repair that was recognizable as such was considered unacceptable. For this reason, and also because part of the purpose of the manual is to give an account of the art of Chinese book restoration as traditionally practiced, I have not gone as far in the direction of ideological purity as many modern conservators would wish, and have retained, for example, sections on sources of old paper (see "Selecting Paper," below), and the coloring of new paper to match the old (see "Coloring," below), information that need not be taken as prescriptive.

With the approval of Du Weisheng I also deleted several sections describing quick methods of carrying out certain procedures, which were all to a greater or lesser extent inferior. As the authors' preface indicates, the manual was intended to meet an urgent need for instruction at a time when the national stock of rare books was being reviewed. In the field of book restoration, as in many others, there is a dire shortage of skills in modern China, owing in part to the bitter legacy of the Cultural Revolution. Shortcuts were therefore described to enable large numbers of old books to be restored quickly and returned to use. As these shortcuts are not used in Peking Library and other major centers, they were eliminated from the text, as were many repetitive passages.

Following my visit to Peking, it was clear that my work had already become more than simply a translation, and that if it were to be of any use to Western conservators, the very purpose for which I had made it, much additional textual information would have to be supplied. On the other hand, such unnecessary information as the basic requirements of a conservation workshop, for example, could clearly be omitted. Furthermore, as the original manual had no text figures, and the plates were too poor in quality to permit further reproduction, these matters, too, would require attention. At this stage, the help of Christopher Clarkson and his interns became essential.

Christopher Clarkson's instinctive and sympathetic grasp of his

subject first became apparent to me during his time as chief conservator in the Bodleian Library. Through his insights into the process of book conservation, accumulated in the course of a distinguished career that began in the aftermath of the Florence floods, and included some time as head of Rare Book Conservation in the Library of Congress, he has not only given me invaluable guidance as my work has proceeded, but has produced all the explanatory text figures. He is currently head of the Department of Book and Manuscript Conservation at West Dean College in Sussex, and for some years has been using the draft of this manual, whose essence is practice, to develop among his interns an understanding of, respect for, and sympathy with non-Western approaches to book-binding. Through close reading and experimentation with the techniques described, many insights have been gained, mistakes revealed, and the text revised accordingly. I sincerely thank Christopher Clarkson for his major contribution to the manual, and must also mention the name of his very capable student Robert Minte, now superintendent of the Conservation Bindery at the Bodleian Library, who has thoroughly digested its techniques with spectacular success. His treatment of the *Ershisi xiao* (Sinica 41) — a unique surviving printed edition whose cover bears what is probably the earliest Western inscription on a Chinese book, in Dutch, and dated 1603 — is exemplary.

The text has now been considerably rearranged, and certain sections, mainly those containing background information, have been entirely rewritten, with free addition of material not contained in the original. As it stands, although the text may be taken as an authentic account of traditional Chinese practice, wholly based on Xiao Zhentang's original manual, current practice in Peking, or analysis of historic examples, unless otherwise stated, I must therefore accept responsibility for the information it contains. This gives me some cause for concern when, for example, the use of soda and boiling water is so liberally prescribed for washing dirty leaves — one plate in the original manual even shows Xiao Zhentang pouring the water onto the leaves straight out of a kettle. Modern conservators should exercise their own judgment in these matters, and should also remember that Chinese paper is often extremely thin, and when wet, is virtually impossible to handle without many years of experience.

Chinese books tend to be very long and to have many leaves. It

is therefore particularly important to work simply and methodically, and throughout the manual, working practices are described that time has proved to be the most efficient. The Chinese art of book restoration has a longer history than any other. Some of its techniques have been in use for many centuries and have enabled paper documents to survive for well over a thousand years, so although some accommodation might be made for a left-handed conservator, as all the directions in the manual are intended for a right-handed one, it is doubtful if major departures from traditional practice would offer any advantage.

Many of the processes described are so closely related and interdependent that I must emphasize the absolute necessity of reading the entire text of the book before starting work on any particular operation, however minor it may appear. The treasures in our libraries are irreplaceable, and another cardinal rule of modern book conservation is that it is far better to put a damaged book in a box and leave it alone until you have developed the skills to repair it, than to make a mess of it.

David Helliwell
OXFORD, 1994

THE PRINCIPAL BINDING STRUCTURES

The earliest Chinese written records are inscribed on the so-called oracle bones found at Anyang, the capital of the Shang dynasty from roughly 1400–1100 B.C.E. Two pieces of these inscribed tortoise plastrons were tied together and bore the characters “fascicle six.” It is therefore apparent that as early as the second millennium B.C.E. the Chinese had already begun to devise means of organizing and storing their written records. Whether later or even concurrently, wooden tablets, smooth strips of bamboo, and silk were used as writing materials.

The eunuch Cai Lun is traditionally credited with the invention of paper in C.E. 105, but archaeological finds over the last thirty years have shown that paper made of hemp fiber (*Cannabis sativa*) was being produced as early as the first century B.C.E. However, Cai Lun may have been the first to organize the production of high-quality paper for writing, and to make paper from the bark of the paper mulberry (*Broussonetia papyrifera*). With the invention of paper, the binding structures with which we are familiar developed comparatively quickly, and it is with

the restoration of these paper binding structures that this manual is concerned.

The Scroll

Paper began to supersede bamboo strips and silk as the principal writing material during the third century C.E., when the contemporary binding structure was the horizontal scroll (*juanzhou*). Just as bamboo strips were tied together and rolled up as if they were silk, several sheets of paper were pasted together to form a long sheet and treated in exactly the same way. The paper was often dyed yellow with the bark of the Amur corktree (*huangbo*), and fine lines were sometimes traced onto it as a guide to the calligrapher, a practice in which the printed text frame must have originated. Scrolls were often edged with beautifully colored paper and mounted on wooden rollers, which were sometimes fitted with ivory, jade, or glass ends, so that they presented a really splendid appearance. (See plate 1.)

The scroll remained in use as the principal means of binding written records throughout the Six Dynasties (420–589), the Sui (589–618), and the Tang (618–907), but the biggest corpus of material from this period, which was discovered in the early years of the twentieth century in the rock-hewn caves of Dunhuang, also includes other binding structures that remained in use until modern times. These include the fold binding (*zhezhuang*, often translated “accordion binding” on account of its appearance), and even some early examples of the butterfly binding (*hudiezhuang*).

The Fold Binding

The longer the scroll, the more inconvenient it was to gain access to the contents, particularly if they were toward the end. This problem was solved by the invention of the fold binding, which took place during the seventh and eighth centuries. With the fold binding, the paper is not rolled up, but as its name suggests, is folded in zigzag fashion in panels eleven or twelve centimeters wide, with boards of thicker paper pasted at either end to form protective covers. As large quantities of Buddhist sutras were being imported into China at this time, it is most likely that this structure developed under the influence of the Indian *pothi* binding, where rectangular strips of palm leaf are simply piled up, threaded

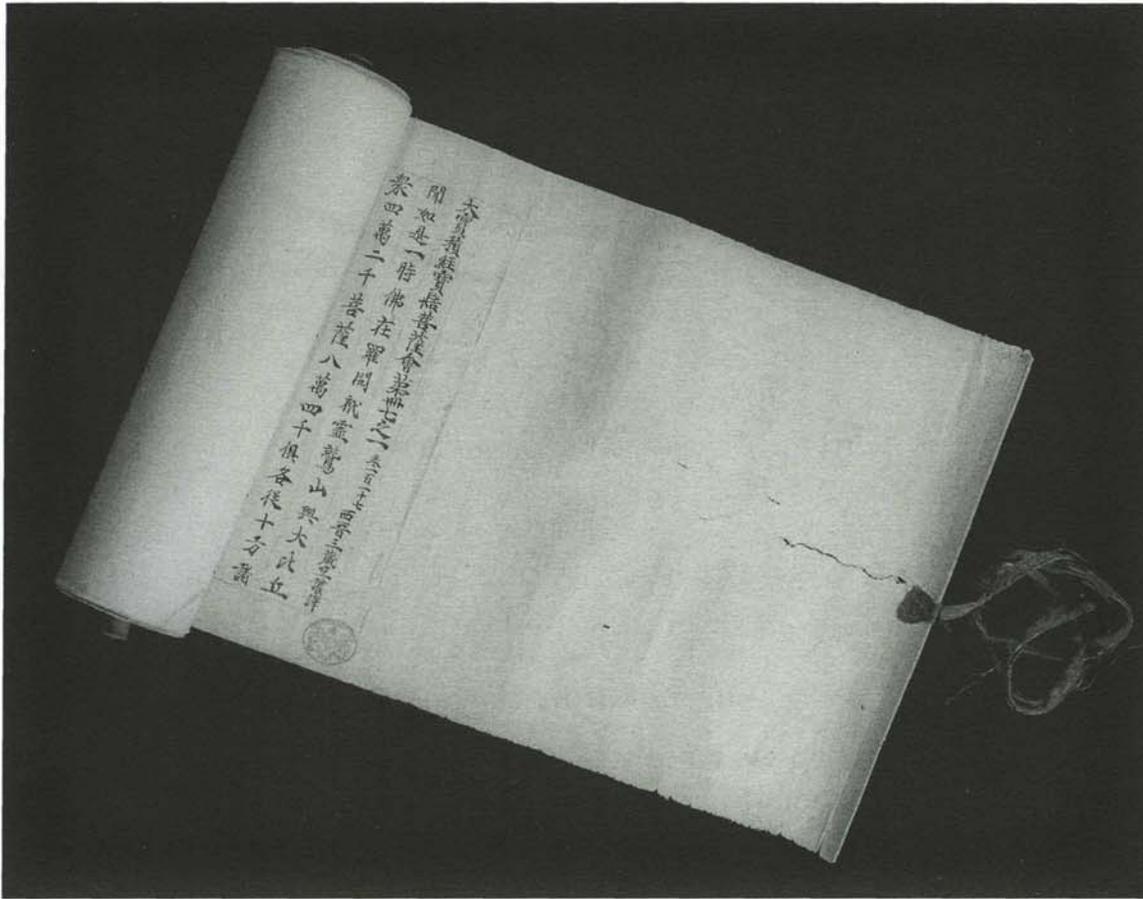


PLATE I. Scroll. This scroll is from the Stein Collection of the British Library, and is an eighth-century Buddhist scripture from the famous cave temples of Dunhuang in Chinese Turkestan. The paper is thick, and has been colored yellow, probably with a decoction of the bark of *Phellodendron amurense*. Even after the passage of twelve centuries, it is so soft and flexible that the scroll will lie open under its own weight. Figures 47 and 48, illustrating the way in which the scroll is attached to the roller and the ribbon to the scroll, are drawn from this example. British Library, OMPB Or.8210/S.351.

through with cords at either end, and placed between wooden boards for protection. The fold binding was probably most widely used during the eighth and ninth centuries, but in view of its close association with Buddhism has continued as the preferred binding format for Buddhist canonical works, so that it is often known as the sutra binding (*fanjiazhuang*). By association, it is also used for binding Daoist scriptures. A modified form of the fold binding is used for binding mounted ink squeezes, illustrated albums, and so forth. (See plate 2.)

The fold binding was much more convenient to use than the scroll, but it was easily torn along the folds of the paper. Also, as printing became the principal method of reproducing books during the eighth century, it must have become apparent that although paper could be joined into horizontal lengths of considerable size, there was a limit to the size of printing blocks. The origins of the Chinese codex are as uncertain as those of its Western counterpart, but it may have developed in response to this consideration. The codex first appeared at the end of the Tang Dynasty in the early tenth century in the form of the butterfly binding, which subsequently developed into the wrapped-back binding (*baobeizhuang*), and then the thread binding (*xianzhuang*).

The Butterfly Binding

The butterfly binding was formed by folding the leaves (which were printed on one side only) in half, pasting them together at the folds, and fitting them with stiff covers. When closed, the finished binding looked like a Western book, but when the leaves were opened they resembled the wings of a butterfly, from which the binding structure took its name. (See plate 3.)

According to the *Official History of the Ming Dynasty* (*Mingshi*, Beijing: Zhonghua shuju, 1974, p. 2344), "the books in the Imperial Library had all come down from the Song [960–1280] and Yuan [1280–1368] dynasties, and were extremely beautiful; they were all bound with the leaves folded text inward so that the white borders were on the outside, thus preventing the text from being damaged by insects and rodents." It therefore seems that the butterfly binding was the standard codex format throughout these two dynasties. Although there are many books extant from the Song and the Yuan, the reason original examples of the butterfly binding are so rare is that when the books were restored

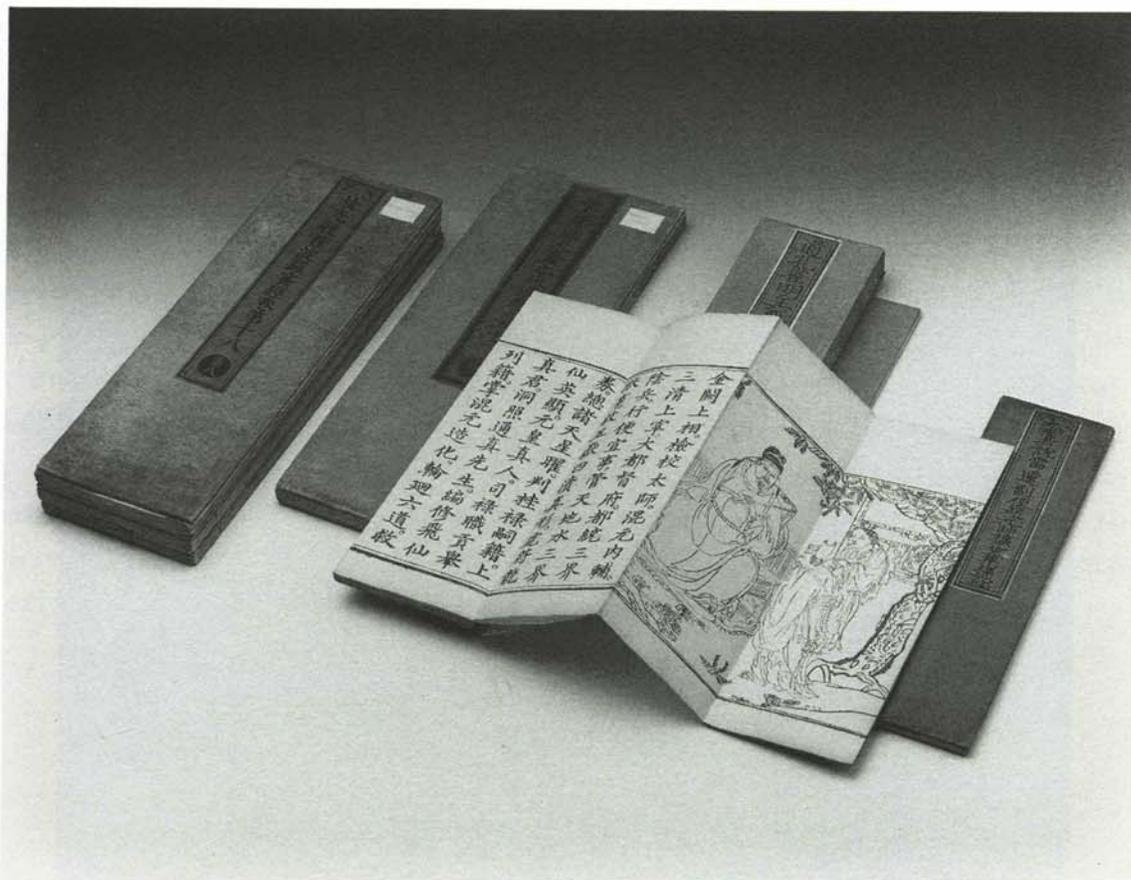


PLATE 2. Fold bindings. The fascicles covered in light yellow silk piled up on the left are from the Ming-dynasty "southern" Buddhist Tripitaka. The large fascicle next to it is from the Zhengtong Daozang (Daoist Canon). The rest are all Wanli-period imperial editions of individual Daoist scriptures. Bodleian Library (left to right), Sinica 2903, Sinica 2902, Sinica 2899 (open), Sinica 2895 (underneath), Sinica 2898.

during the Ming and Qing (1644–1911) dynasties, they were rebound in the contemporary wrapped back and thread bindings. As indicated in the *Mingshi* account, the advantage of the butterfly binding is that even if the edges of the fascicle are damaged, the text is unaffected, and the *banxin* is protected by being pasted into the *shunao* rather than exposed at the *shukou*. (These terms are explained in "Terminology," below.) Also, when the fascicle was opened, the whole rather than only half the area of the printed leaf could be seen at a glance, a feature that was particularly useful in the case of large illustrations. The disadvantage of the butterfly binding is that when the fascicle is opened, the single leaves tend to cling together with the text inward, especially if the paper is thin, presenting the reverse side of the leaf to the reader. Using books bound in this way is therefore often fiddly and time consuming.

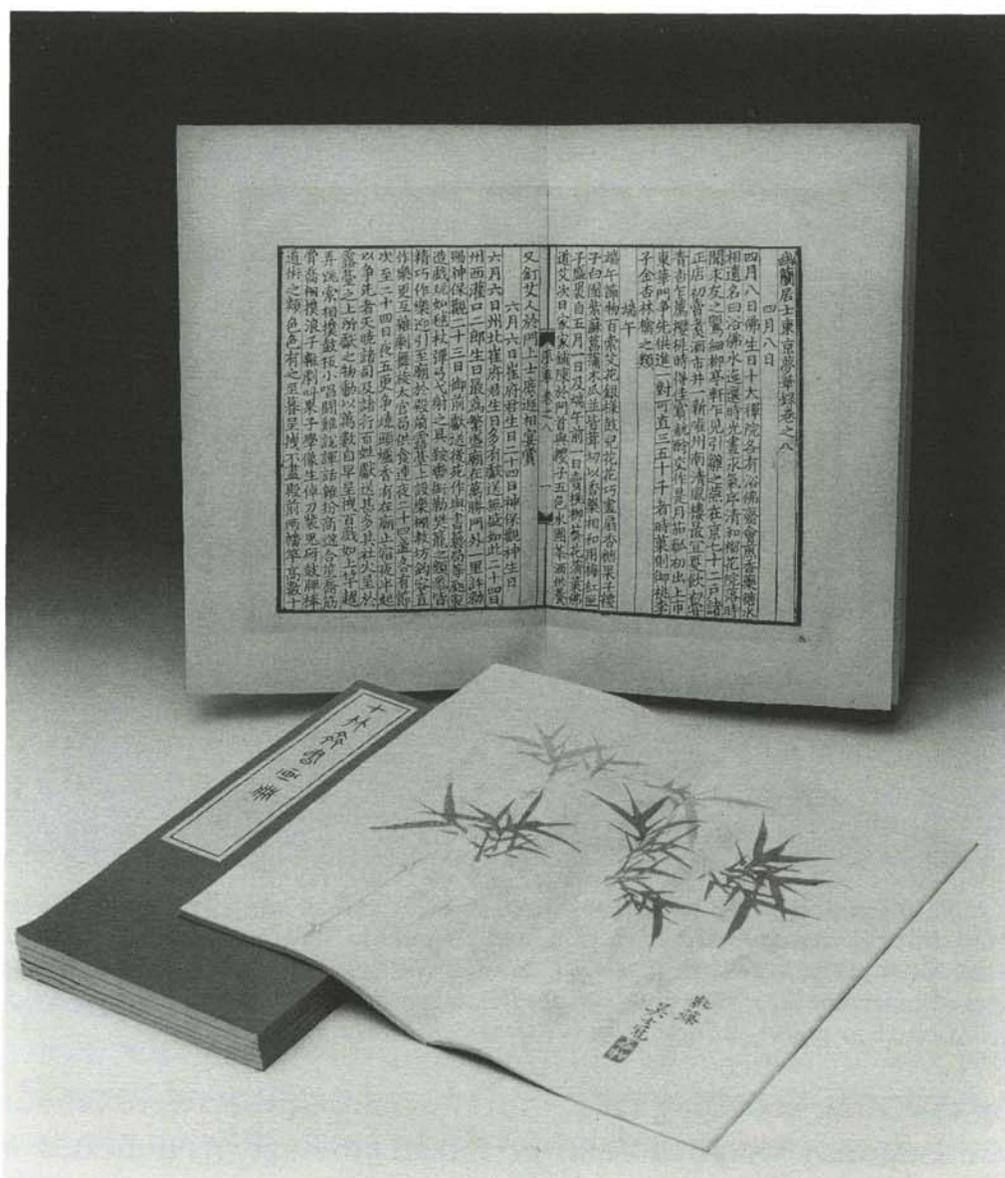


PLATE 3. Butterfly bindings. Both the editions illustrated here are modern facsimiles. The book standing upright in stiff boards is a facsimile of a Yuan-dynasty edition in the Seikadō Bunko in Tokyo. The orientation of the tail-edge inscriptions on some of these butterfly bindings suggests that they were originally shelved on edge, with the *shukou* downward and the *shunao* uppermost. With the leaves folded inward, and shelved with their folds uppermost, the printed area of the butterfly book thus had complete protection from abrasion. The picture book shown below is a modern facsimile edition of the famous *Shizhuzhai shuhua pu*, printed and bound by traditional techniques in Shanghai. Note how the butterfly format allows the illustration to open out almost completely flat, exposing the entire area of the leaf. Bodleian Library (top to bottom), Sinica 2841, Sinica 2742.

The Wrapped-back Binding

The problems of the butterfly binding were overcome by simply reversing the entire structure of the binding. The leaves were folded with the text on the outside, and instead of pasting them together at the *banxin*, the two free edges of each leaf were held together in the *shunao* by inserting paper twists through them. The binding was then finished off by pasting a sheet of paper onto the covers and around the *shunao*, for which reason this structure is known as the “wrapped-back binding.” (See plate 4.)

The wrapped-back binding came into use during the Yuan dynasty and superseded the butterfly binding for most purposes during the early Ming. It remained the standard binding format until the Jiajing period (1522–1566).



PLATE 4. Wrapped-back binding. This is an imperial edition dating from the Jiajing period of the Ming dynasty (early sixteenth century), which has been restored, but the original wrapped-back format has been retained. During the later part of the sixteenth century, the thread binding began to supersede the wrapped-back binding, and many works such as this were rebound in the newer format, just as the butterfly bindings of the Song and Yuan dynasties had been turned into wrapped-back bindings during the Ming. Even wrapped-back bindings that date from comparatively recent centuries are therefore somewhat rare. These fascicles are held together by three double-pointed paper screws, and the position of one of these can be seen through the cover of the uppermost of the three closed fascicles. The large square seal at the beginning of the text indicates that this item was once in an imperial collection. Bodleian Library, Backhouse 281.

The Thread Binding

Quite early in the Ming dynasty, the thread binding made its appearance. In its basic structure, the thread binding is exactly the same as the wrapped-back binding: the leaves are in the first instance held together by paper twists, but instead of the so-called wrapped back, paper covers are made and bound onto the *shunao* with thread. The thread binding represents the final stage in the development of the traditional Chinese codex, and began to supersede the wrapped-back binding during the Wanli period. It had many advantages over its predecessors, and remained the standard binding format for almost all purposes until the introduction of modern Western printing and binding processes during the late nineteenth and early twentieth centuries. (See plate 5.)

The thread binding is not only beautiful to look at, but convenient to use. It is strong, and rarely comes apart. When the threads break, they are easy to replace, and in the meantime the pages are still held securely together by the paper twists. The use of paste is minimal, which has the effect of reducing the susceptibility of the book to attack by insects, and also of making it simple to rebind. Provided that the fascicles of a thread-bound book are handled carefully and always stored in a protective case, they will last indefinitely.

The Rough Binding

As in the West, newly printed books were often supplied in an unfinished state. The pages were folded and held together by paper twists, so that purchasers could complete the process by trimming, fitting the covers, and stitching them on in their house style. This simple structure is called a rough binding (*maozhuang*), a term that may refer either to the "crude" or "unfinished" state of the binding, or to the deckle edge of the leaves, which being untrimmed, are clearly visible and give the binding its characteristic appearance.

Although it is not actually an independent structure, being simply the first stage in the construction of the wrapped-back or thread binding, scholars would often use the rough binding to keep bundles of manuscript notes together with no intention of proceeding to the later stages. It was occasionally called the "paper-screw binding" (*nianzizhuang*), and was often not even provided with covers. (See plate 6.)

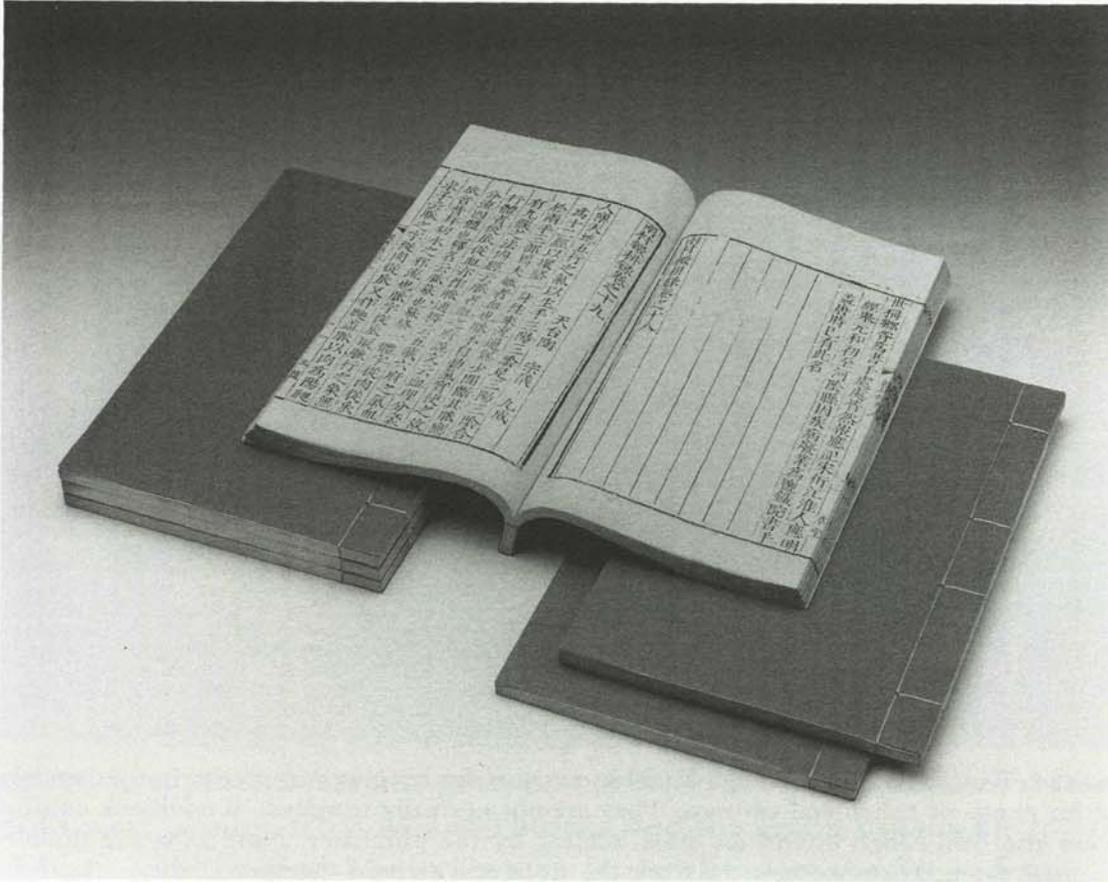


PLATE 5. Thread binding. This book is a Wanli edition (late sixteenth century), which was probably restored in the Liulichang at the beginning of the twentieth century, and is an excellent illustration of the methods described in Xiao Zhentang's manual. Note how the paper is in pristine condition and still perfectly flexible, allowing the leaves to lie open under their own weight without having to be held down; this is exactly how a Chinese book should function, no matter what structure has been used to bind it. Bodleian Library, Backhouse 467.

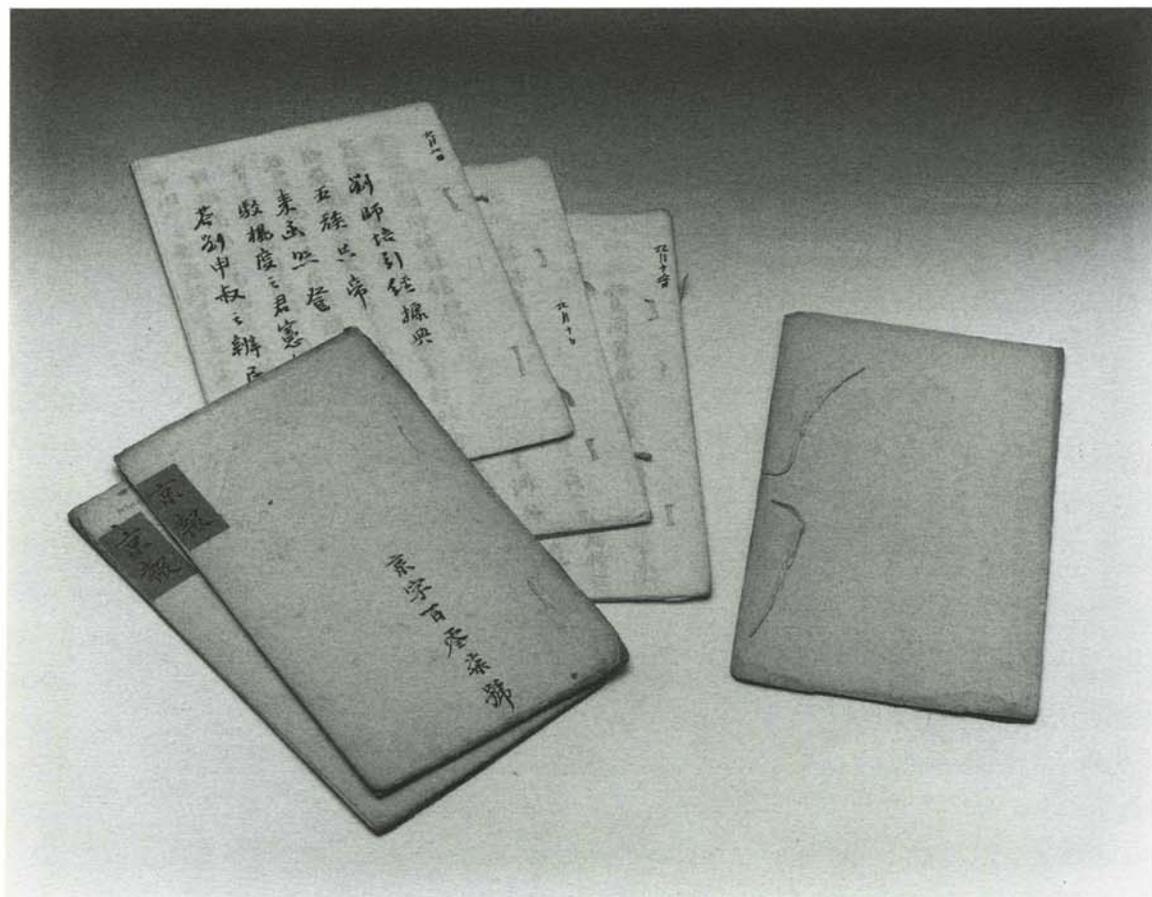


PLATE 6. Rough bindings. Rough bindings are used for keeping manuscript notes together, or for cheap or ephemeral editions. They are not normally trimmed. Woodblock editions were also sold rough bound for final binding by the purchaser. Note how the double-pointed paper twists are inserted from the front and twisted together at the back of the fascicle. Bodleian Library, Backhouse 531b, Magd.Coll.Chin.9b.

The "Jade Set in Gold" Binding

The "jade set in gold" binding (*jinxiangyu*) is not a structure in which books were bound from the outset, but rather an extremely sophisticated preservation technique which is fully described below (see "The 'Jade Set in Gold' Binding," below).

TERMINOLOGY

It is impossible to describe repair and binding procedures accurately unless a terminology for the various parts of the individual leaf and the bound fascicle is first set out. As this manual has been prepared for the

use of the Western conservator, whose training will have been in the European tradition, wherever possible the terminology of that tradition is simply transferred to the Chinese book. Although both traditions tend to use the analogy of the human body, there are some differences.

The term "book" is used for the whole object, which in the case of the Chinese book usually consists of a number of fascicles, often as many as several dozen or even hundreds. Each fascicle is identical in height and width, but often varies in thickness. Within each fascicle there are leaves that bear text; these are protected by endpapers and covers. It is interesting to note that in Chinese there is a special word, *shupin*, that is used to distinguish the book as an object from the book as a text.

The Leaf

The leaves of a Chinese book only bear text on one side of the paper, which is usually folded with the blank side inward. It is therefore not correct to speak of "pages," much less of "recto" and "verso"; even the commonly used term "double leaved" is open to question, as it gives the impression that two leaves are used where in the case of the Western book we should expect to find one. (See plates 7 and 8.)

The naming of the head, tail, and sides of the leaf, with their respective edges and margins poses no problem. Most traditional Chinese books were printed from wooden blocks, and the text is usually enclosed within a solid printed border, which is translated as the "text frame." The printed area is usually positioned toward the tail part of the leaf, so that the head margin is bigger than the tail margin, leaving plenty of room for marginalia, which in Chinese are therefore known as "eyebrow comments" (*meipi*). The leaf is folded down the center, and the central column of the printed area is known as the *banxin*, which means heart or center of the printing block. Although bibliographers tend to use the terms *banxin* and *shukou* interchangeably, this is not strictly correct for reasons described below (see "The Fascicle"). Within the *banxin* there is usually at least one "fishtail" (*yuwei*). This is a device that is used to indicate to the binder the exact center of the printed area, so that the leaf can be folded accurately. Details of the style and format of the text frame, *banxin*, and fishtail are of great interest to bibliographers, as they are used to compare and identify editions.

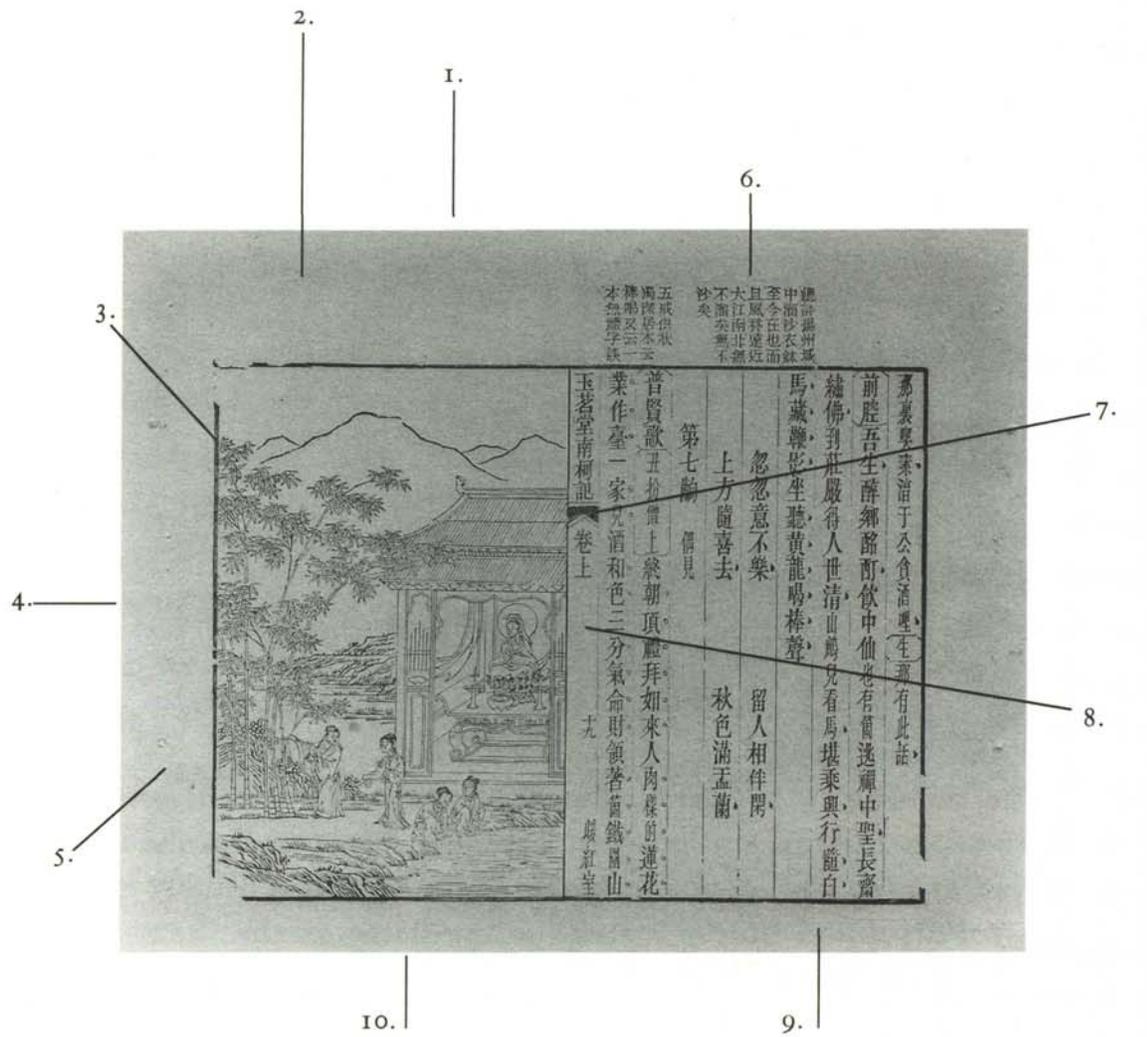


PLATE 7. Leaf (opened out). 1. Head edge; 2. Head margin; 3. Text frame; 4. Side edge; 5. Side margin; 6. Annotations (printed); 7. Fishtail; 8. *Banxin*; 9. Tail margin; 10. Tail edge. Illustrated leaf from the Ming drama *Nankeji*.

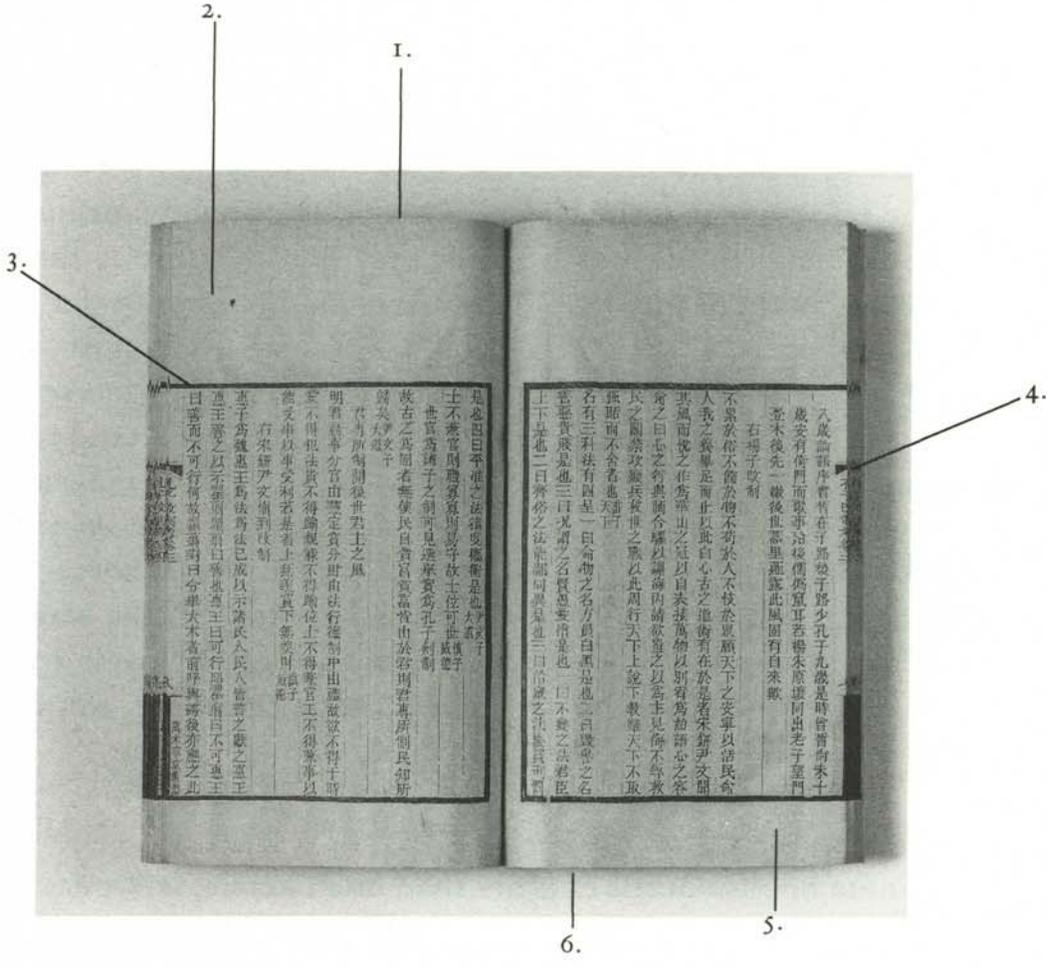


PLATE 8. Leaf (bound up). 1. Head edge; 2. Head margin; 3. Text frame; 4. Fishtail; 5. Tail margin; 6. Tail edge. Bodleian Library, Sinica 3062.

The Fascicle

The leaves are bound together to form fascicles, and most terminology relating to this part of the book too is in no need of further explanation. Use of the terms "fore edge" and "spine" has been avoided, as both usually function quite differently from their Western equivalents. (See plate 9.)

The book opens at the *shukou*, which appropriately means "mouth of the book," and the leaves are held together and flex at the *shunao*, which means "brain of the book." These two terms do not refer to edges, but to general areas. Owing to its lack of precision in English, the term *shubei* ("back of the book") has been translated as the "*shunao* edge."

In the thread binding, the terms *shukuo* and *banxin* tend to be used interchangeably because the *banxin* is exposed at the *shukou*. In the butterfly binding, however, the *banxin* is pasted into the *shunao*, and it is the side margins of the leaf that appear at the *shukou*. Whereas the term *banxin* refers to the central column of the printed leaf, the term *shukou* refers to part of the binding structure, which does not come into being until the leaves are bound. In the present work, therefore, some attempt has been made to use these terms precisely.

The Book

Most Chinese books consist of more than one fascicle, irrespective of the structure into which they are bound. The fascicles are divided into conveniently sized batches and encased in *han*, which literally means "container." The *han* can take many forms, the most important of which are described below. Traditionally, and even now in the best circles, books are laid horizontally on the shelf. However, in many libraries in both West and East, they are nowadays stood vertically, like Western books.

At its simplest, the *han* consists of two wooden boards strung together, the fascicles being tied between them. These are known as *jiaban* ("pressing boards"), and are usually made of polished camphorwood or catalpa. They were often used in southern China, where the camphorwood gave protection against insects. Also, *jiaban* allow for air circulation and

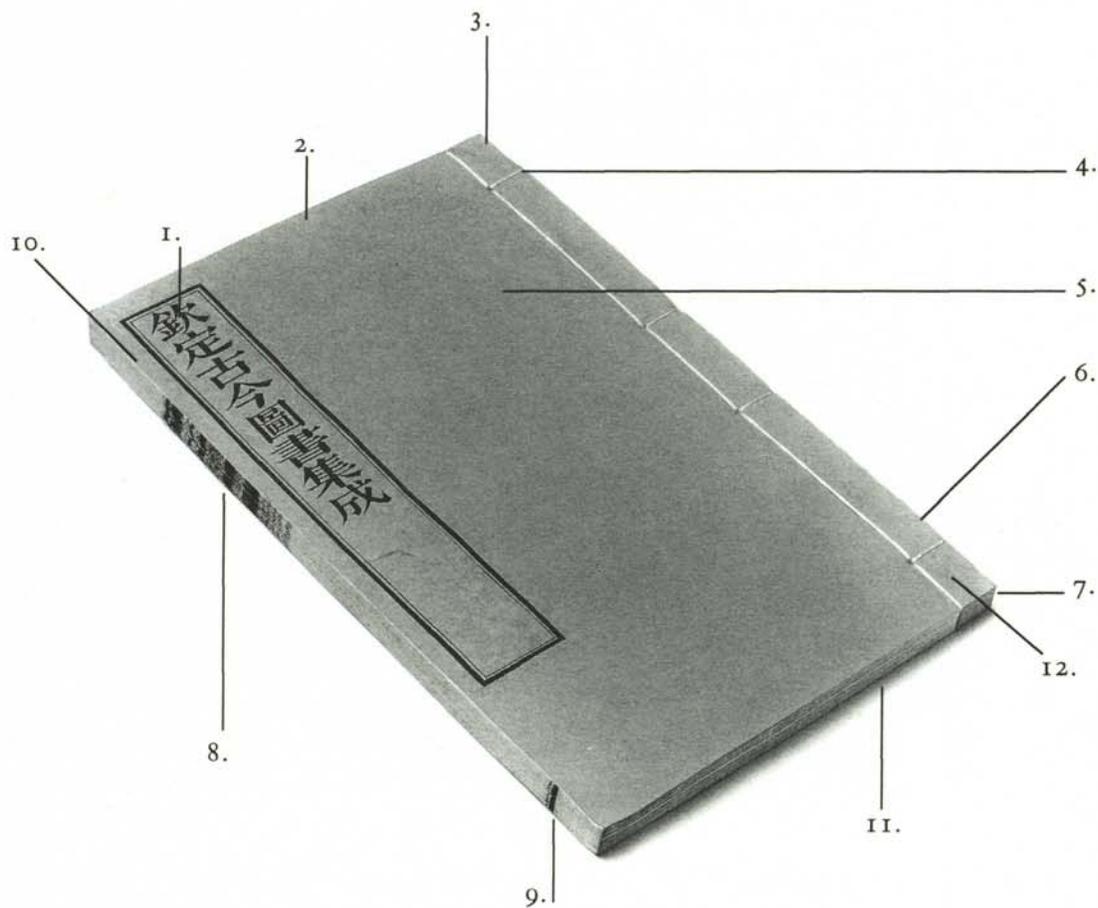


PLATE 9. Fascicle. 1. Label; 2. Head edge; 3. Head *shunao* corner; 4. *Shunao* edge; 5. Upper cover; 6. Lower cover; 7. Tail *shunao* corner; 8. *Shukou* edge; 9. Text frame (tail); 10. *Shukou*; 11. Tail edge; 12. *Shunao*. Bodleian Library, Backhouse 311.

are not constructed with paste, the single greatest attraction for insects and other vermin. The title of the book is sometimes carved into the wood. (See plate 10.)

The best type of *han* is the *muxia* ("wooden box"), which is usually reserved for the finest and oldest editions. These are also made of camphorwood or catalpa, glued together without the use of nails. The title of the book is beautifully carved on the front panel, which slides up to give access. The fascicles are placed on camphorwood boards and slid horizontally into the box. These boards protect the book against both insect damage and abrasion as it is slid in and out of the box. Obviously such boxes are usually shelved horizontally. (See plate 10.)

By far the most common type of *han* is the wrap-around *tao*. This is made of cardboard covered in cloth, lined with paper, and fastened with bone pegs. The cloth is usually blue cotton, but for fine editions, silk brocade is sometimes used. The *tao* may have head and tail flaps, and sometimes the inner flaps interlock ingeniously as they are folded together. (See plate 11.)

Since the purpose of the *han* is to protect the fascicles inside it, it is obviously the first part of the book to sustain damage. Chinese book collectors and restorers used not to regard the *han* as an integral part of the book, so whenever it was damaged, they simply discarded it and made a new one. Modern conservators, however, might wish to consider the possibility of restoring original *han* if they are obviously of some age and value, but this process receives only brief treatment by Xiao Zhentang (in "Restoring the *Tao*," below; see also "Constructing the *Tao*," below).

PREPARATION

Tools

The ancients had a saying: "If a craftsman wants to do a good job, he should first know the tools of his trade." In this section, some of the more important tools used in Chinese book restoration are therefore described and an account given of their use. Particular emphasis is placed on those that are unfamiliar in the Western tradition.

Apart from the bench or table, the Chinese restoration workshop usually contains a lacquered lining table. This is 2 meters long and 1.2

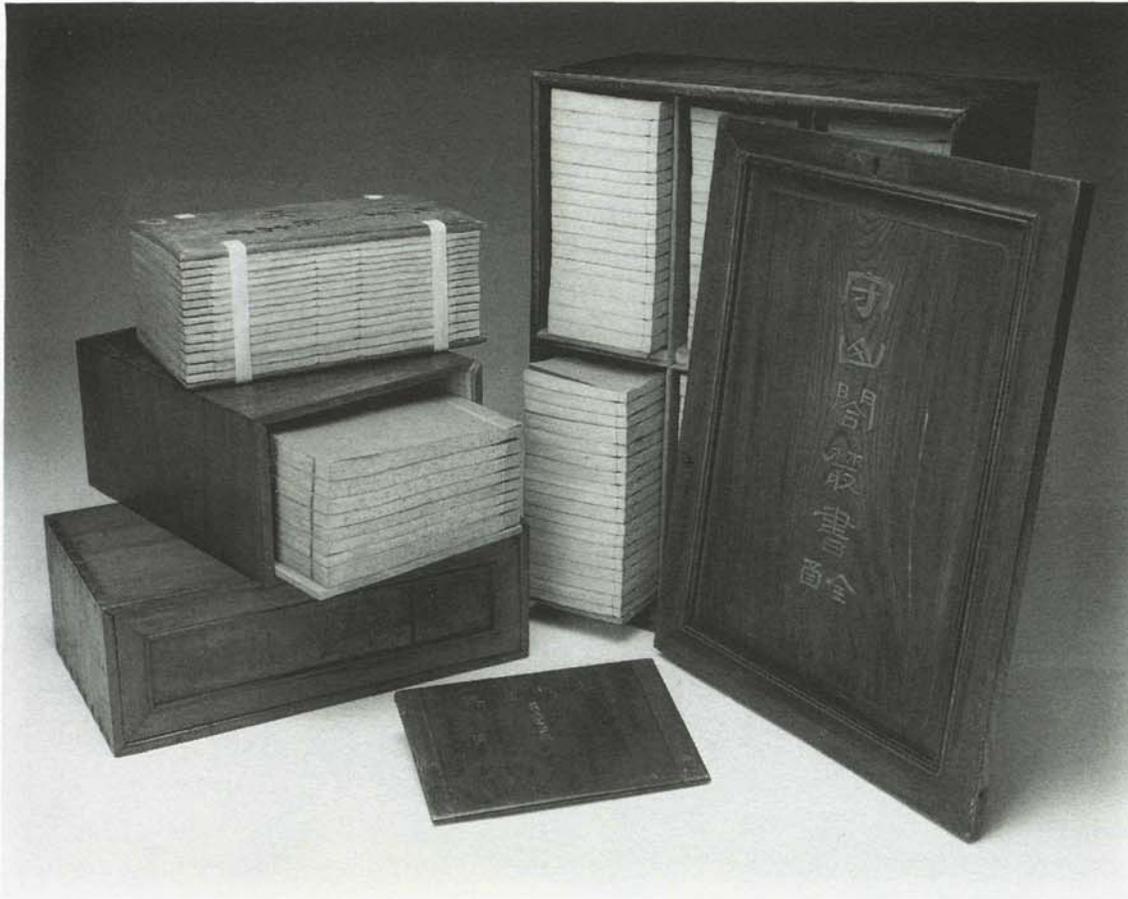


PLATE 10. *Jiaban* and *muxia*. The use of *jiaban* is the simplest way to keep groups of fascicles together and protect them from abrasion, and can easily be improvised. *Muxia* not only give the book complete protection from abrasion, dust, and light, but the camphorwood from which they are constructed is repellent to insects and imparts a beautiful fragrance to the paper. Note how the piles of fascicles are placed on a wooden board before being slid into their cases, thus avoiding even the slightest abrasion. The title of the book is elegantly carved on the front of each box. *Muxia* are unquestionably the best means of storing Chinese books. Bodleian Library (*top to bottom, left to right*), Backhouse 479, Backhouse 163, Backhouse 231, Sinica 2623.

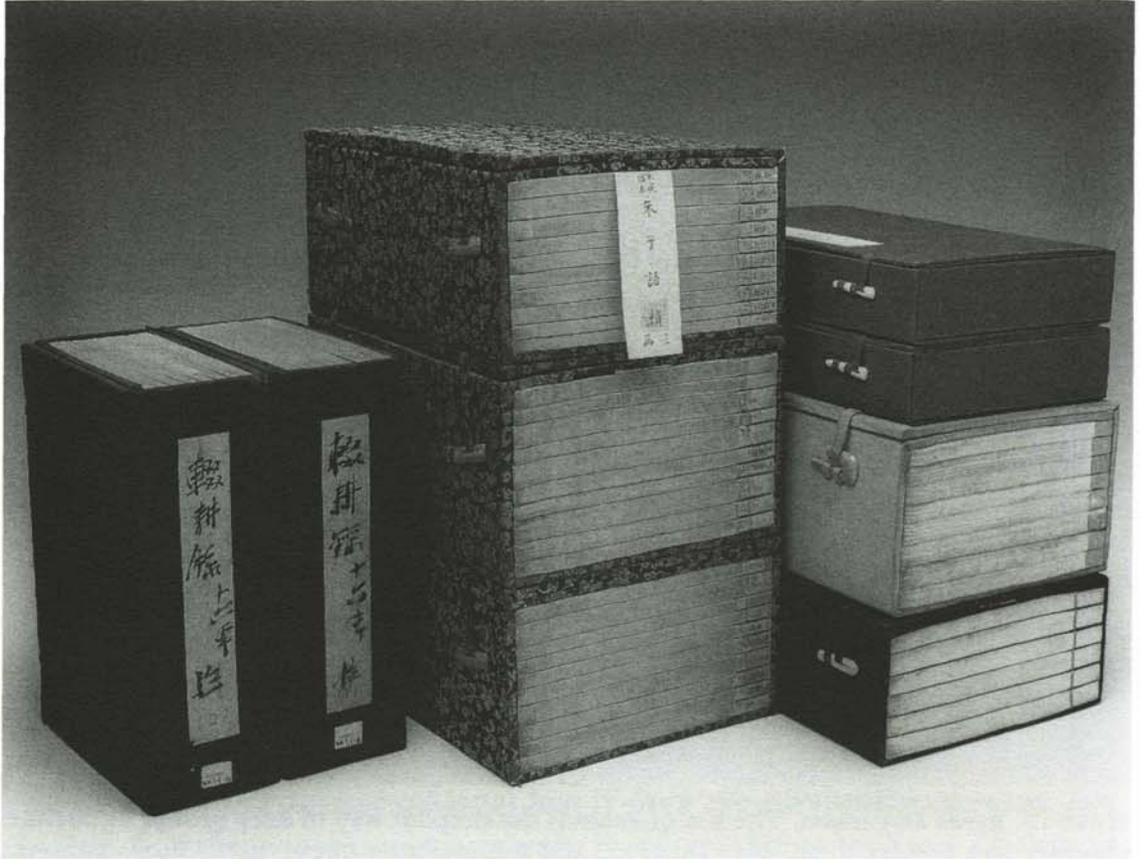


PLATE II. Wrap-around *tao*. A group of *tao* covered with various fabrics, including the usual indigo-dyed cotton, but also the costly silk brocade associated with fine editions, and the yellow material associated with imperial editions. The use of head and tail flaps as in the pair of *tao* in the top right of the picture is quite common, but most *tao* are of the simpler construction. Chinese books should always be shelved flat, but are now often shelved vertically like Western books, as indicated by the position of the labels on the pair of *tao* in the left of the picture. Bodleian Library (left to right, top to bottom), Backhouse 467, Backhouse 241, Sinica 2869, Backhouse 311, Backhouse 576.

meters wide, and is made of Chinafir (*Cunninghamia*). It is painted with red lacquer, so that the surface is extremely smooth, hard, and flat and provides a good contrast to the paper. The table is used for lining scrolls or large sheets of paper, such as maps, large leaves, or cover paper. In the absence of a lacquered lining table, a varnished wooden board can be used. This should be 60 centimeters square, 2 centimeters thick, and perfectly flat. The surface should have horizontal and vertical lines ruled on it, and the board should then be varnished.

Paper that has been lined is pasted onto a wallboard to stretch and dry. The wallboard should be 1.8 meters long and 1 meter wide. It is made of strips of wood 3 centimeters wide, joined together to form an oblong frame. Several layers of white paper are then pasted onto the board. The surface should be perfectly flat, and the paper covering should adhere firmly to the wooden board. Paper repair is carried out on a pasteboard. Pasteboards are fifty centimeters long, forty centimeters wide, and one centimeter thick. They consist of several layers of rough strawboard. The edges are bound all the way around with cotton cloth, and both sides are covered with white paper. When the covering gets dirty, a new sheet of clean paper is pasted over it.

Pressing boards of different sizes are needed. These are used in many of the repair and binding processes, and are made of camphorwood or catalpa. The front, back, and sides of each board should be sanded perfectly smooth to avoid damaging the leaves of the book if they happen to rub against it. The boards should be a little bigger all around than the book that is being repaired.

The trimming board is used for cutting paper to size and trimming books, and should be sixty centimeters long, forty centimeters wide, and three centimeters thick. It is made of poplar or Chinese linden. The awl board is the same size as the trimming board, and is used for piercing the binding holes.

The stone on which the book is placed for beating down (see "Beating Down," below) is thirty-five centimeters long, twenty-five centimeters wide, and five centimeters thick. It is made of marble, and should be perfectly flat. It can also be used for pressing.

The oblong handstone is eleven centimeters long, seven centimeters wide, and three centimeters thick. It is also made of marble, and all

six surfaces should be both perfectly flat and highly polished. The oblong handstone is used to make crisp folds when fitting corner protectors (see "Fitting Corner Protectors," below) or fully folded covers (see "Making the Covers," below).

For cutting paper to size and trimming, there should be knives of various sizes, which are used in conjunction with a straightedge. The straightedge should be fifty centimeters long, five centimeters wide, and one centimeter thick. It is made of Chinafir and edged with bamboo. Scissors and a setsquare (right-angled triangle) are also needed.

Several other tools are needed for paper repair. The atomizer is used for spraying (see "Spraying and Flattening," below). For manipulating pieces of paper, tweezers are sometimes needed. The bamboo knife and bone hairpin are used for gently prizing apart leaves that are stuck together.

For making paste (see "Paste," below), basins will be needed, and also a pan, a sieve, a spatula, and a pestle. The pestle should be made of Chinese scholartree, elm, or something similar. The head should be round, and somewhat flattened, so that it is suitable for mashing the paste.

For applying paste and water, a brush is needed. Ordinary, cheap Chinese writing brushes are used. Such brushes are made of goat hair, and are very soft. The *paibi*, literally "row of brushes," is appropriately named, as it consists of a row of goat-hair brushes held together by strips of bamboo. It is used for pasting large areas of paper, usually during the process of lining. To prevent the *paibi* from shedding hairs and hindering the work, before it is used it should be soaked in a solution of gum and alum, rinsed, shaken out, and put in a shady place to dry. Alternatively, a stronger solution of gum can be applied with a dropper at the point where the hairs enter the bamboo tubes. The *zongshua* has bristles of palm fiber, and is therefore a much stiffer brush than the *paibi*. Sometimes the bristles are elaborately woven in various designs to form a handle, and sometimes the handle is of wood. It is usually used dry to firm down lining paper, but for certain purposes it is also used to apply paste — when lining silk, for example (see "Making the Covers," below), or when pasting the *shunao* edge of a *hudiezhuang* (see "Butterfly Binding Method 1," below). Both *paibi* and *zongshua* are made in various widths, ranging from a few centimeters to thirty centimeters or more. (See plate 12.)



PLATE 12. Brushes. On the right, two *zongshua* of different sizes. On the bottom left, a simple writing brush, with two *paibi* of different sizes above. All were obtained from shops in Peking.

Repairs are beaten down with the flat-headed hammer (see "Beating Down," below). The head is made of iron, and should be three centimeters square and seven centimeters long. The face should be perfectly flat. The haft is made of wood.

The awl is used for piercing the holes for the paper twists and the stitching. It is twelve centimeters long, and the shaft should be three millimeters thick. It is made of steel. One end is pointed, and the other widens out so that it can be struck with the mallet. The head is usually oval or oblong in section. The awl is struck with a mallet, which is thirty-two centimeters long and four centimeters thick; the width tapers from five centimeters at one end to four at the other. In section it is either oval or rectangular, with rounded corners. It is made of hardwood, such as jujube, pear, or elm. The awl is struck with the broader surface of the mallet.

More elaborate but not strictly necessary pieces of equipment are the mechanical press and the guillotine.

None of the tools need conform rigidly with the above specifications, and each individual restorer may modify them or make substitutions according to the circumstances and his or her own experience, but this should always be done with a clear understanding of their purpose. It is also worth noting that although their work reaches the very highest standards, Chinese conservators rarely display the obsession of their Japanese colleagues with finely crafted and highly specialized tools. When I asked Du Weisheng where I might buy some of the tools in use in his workshop, he simply laughed, and told me to get some old steel, a hacksaw, and a file, and make them myself. Such indeed used to be the tradition of the Western bookbinder too.

Paper

TYPES OF PAPER

Mazhi (the word *zhi*, as used in all the terms in this section, means "paper"), made from Cannabis hemp (*Cannabis sativa*), is among the earliest Chinese papers. Although *mazhi* is an excellent paper, which was used throughout the Tang dynasty for both manuscripts and printed books, it was gradually superseded by other fibers. Most later papers may

be divided into three categories: *pizhi*, which is made from bark fiber, most commonly that of the paper mulberry (*Broussonetia papyrifera*); *zhuzhi*, which is made from the fiber of bamboo or other grasses, such as rice straw; and those made from mixed fibers, a large category, which includes *xuanzhi* and most of the other papers described below. *Pizhi* ("bark paper") is usually called *mianzhi* ("cotton paper"), which causes some confusion as it does not contain any cotton fiber. In general, the greater the proportion of bark fiber, the better the quality of the paper, so that the fine editions published by the imperial government would usually be printed on some kind of *mianzhi*, whereas the commercial editions, which were printed in vast numbers for sale among the people, were almost invariably printed on *zhuzhi*. For example, twenty impressions of the voluminous *Wuyingdian juzhenban shu* were made on *kaihuazhi* (see below) for imperial use, but three hundred were made on *zhuzhi* for sale.

Many kinds of handmade paper are currently produced in China, but only a few are readily available, and most of the papers sold in the Liulichang and Wangfujing in Peking are intended for painting and calligraphy, and have qualities and textures that make them unsuitable for book repair: they are characteristically too absorbent, too rough, or too thick. However, it is at present possible to obtain some twenty kinds of paper in the Liulichang that are suitable for restoration purposes.

Henan *mianzhi* is made purely from paper mulberry, and is white, thin, smooth, long-fibered, and very strong. It is first colored to match the leaves of the book (see "Coloring," below), and then used for repairing the *shukou*, holes, and tears. Uncolored, it is used for lining and for making paper twists. The only other papers suitable for these purposes are Shanghai *mianzhi* or a very good *xuanzhi*.

Shanghai *mianzhi* is actually produced in the provinces of Zhejiang, Anhui, and Jiangxi. It shares the qualities of Henan *mianzhi*, for which it can be used as a substitute. Both Henan *mianzhi* and Shanghai *mianzhi* are produced in very small quantities, and at present it appears that they are commercially unavailable; neither Peking Library nor Shanghai Library has acquired any recently, and both are using stocks laid down over twenty years ago. The Western conservator will have to substitute fine Japanese *kōzo* tissue, which is similar and more readily available.

There are several other types of *mianzhi* that, owing to their thickness, are usually only suitable for making endpapers and covers, and as they are relatively expensive they are not normally used even for these purposes. Zhejiang *pizhi* is the thickest. Guizhou *mianzhi* is darker in color. Guangxi *mianzhi* resembles Guizhou *mianzhi*, but is thicker, even darker, and stronger.

Xuanzhi is the best known type of Chinese paper, and was originally produced in the Tang dynasty at Jingxian in Xuanzhou (modern Anhui), and distributed from the provincial capital of Xuancheng, after which it is named. The best *xuanzhi* is still made in Anhui, followed by Sichuan, Fujian, and Zhejiang. It is made from a fiber called *tanshupi*, the bark of the blue sandalwood (*Pteroceltis tartarinowii*), with the addition of rice straw. *Xuanzhi* is pure white, fine, soft, flexible, resistant to attack by insects, and very long lasting. It has always been considered the best paper to use for painting and calligraphy, and in one form or another may be used for all the principal purposes of book restoration: repairing the *shukou*, repairing holes and tears, lining, interleaving (including the related processes of extending the *shunao* and constructing the "jade set in gold" binding), and making endpapers, paper twists, and covers. As with Henan and Shanghai *mianzhi*, if it is used for making repairs, it must first be colored to match. There are many qualities and thicknesses of *xuanzhi*, which must be selected according to the circumstances. The most common type of *xuanzhi*, and the one most useful in book restoration, is thin, and is known as *danxuanzhi*.

Jiaxuanzhi is a thicker type of *xuanzhi* originally made at Jiajiang in the province of Sichuan.

Mianlian zhi is another paper made of mixed bark and grass fiber. It is white, smooth, soft, and flexible, qualities that make it suitable for interleaving and for making endpapers. Appropriately colored and lined, it is the normal paper to use for making covers. *Jialian zhi* is a thicker type of *mianlian zhi* which may be used for interleaving books printed on thick paper, but otherwise only for endpapers and covers.

Luowenzhi is a type of *mianlian zhi*, named after the distinctive net pattern of the mold in which it is made, a characteristic that makes it easily recognizable. It is the best paper to use for interleaving, as it is white, flexible, and very soft, so that repairs can easily be beaten down.

Kaihuazhi is also a type of *mianlian zhi*, but is no longer produced.

It is a soft white paper of extraordinary quality which was made at Kaihua in the province of Zhejiang during the Qing dynasty, when it was used for printing imperial editions in the Wuyingdian printing establishment.

Maobianzhi has been used for printing books more than any other type of paper, owing to its cheapness. It is produced at Jiangle in the province of Fujian, Taihe in Jiangxi, and elsewhere. *Maobianzhi* is made from bamboo fiber with the addition of rice straw, and is soft and can be very thin. It is smooth on one side, but a little rough on the other. Although it has tensile strength, it tends to be brittle. It is cream colored when new and darkens with age. The marks of the fine bamboo mold in which it is made can be clearly seen. It can be used for repairing holes and tears, interleaving, and making endpapers and covers, but only for books printed on *zhuzhi*. In the case of books printed on *mianzhi*, *maobianzhi* may only be used for lining the covers. Even for repairing the *shukou* and lining leaves of books printed on *zhuzhi*, it is better to use colored Henan or Shanghai *mianzhi*.

Maotaizhi is another kind of *zhuzhi* similar to *maobianzhi*, but is thinner and of slightly uneven thickness. The mold pattern is very pronounced. Both *maobianzhi* and *maotaizhi* were used in great quantities by the late Ming bibliophile and printer Mao Jin (1599-1659).

Lianshizhi is also a thin *zhuzhi*, which was made in Jiangxi. Owing to the fact that it was loaded, it is also known as *fenlian**zhi*. As it was a cheaper paper than *luowenzhi* and *mianlian**zhi*, it was often used for interleaving ordinary editions, the more expensive papers being reserved for fine editions.

SELECTING PAPER

The selection of suitable paper is a most important part of the process of restoring an old book. Historic differences in color, thickness, and the mold pattern should all be taken into account. If the paper has been well matched, it should be difficult to spot any trace of the damage when the work is complete. But if it has been badly matched, no matter how skillful the craftsmanship, the result will not be harmonious. The quality of the restoration of a damaged book depends therefore on the provision of matching paper. It is always best to use old paper, matching the leaves of the book as closely as possible. However, as it is not easy to accumu-

late adequate supplies of different types, especially at the outset when the workshop is being established, it is usually necessary to use new paper, which should be colored to match the leaves that are to be repaired. Only the paper that is to be used for repairing the *shukou*, holes, and tears needs to match, whether it is old paper or colored new paper.

• *Sources of old paper*

Large quantities of old paper will be needed if a badly damaged old book is to be repaired well, so every scrap that can be gleaned in the course of other repairs should be carefully collected. For example, when an ordinary double-leaved book is being repaired, if the endpapers and interleaving are to be replaced, the old ones should be saved and put by for future restoration work. You should also search for any old books that are to be discarded, and tear out the head and tail margins, the *shunao*, or any parts with no text on them. In this way you will gradually accumulate a large supply, which should be sorted according to type so that it is ready for use. If no old paper can be found, new paper of the same thickness as that to be repaired can be used and colored to match. N.B. Do not attempt to select matching paper in light that is excessively bright or dim, or it will not be possible to judge its true color, and the quality of the repair will therefore suffer.

COLORING

• *Purpose*

If no properly matching old paper can be found for repairing the leaves of a damaged old book, new paper can be colored and used instead. New *mianzhi* that is to be used for repairing the leaves of books printed on *zhuzhi* will always need to be colored to match. When selecting paper for coloring, make sure that it is of exactly the same thickness as the paper to be repaired; if it is not, the results of the repair will be unsatisfactory.

• *Materials*

Many of the chemical dyes used for cloth cannot be used for coloring paper, as in the course of time they will begin to react, not only affecting the color but causing damage to the book. The pigments used in book

restoration can be divided into two groups, whose method of application also differs: stains, which are applied cold with a brush, and dyes, which are applied hot by immersion.

The stains used for coloring paper are artists' colors, including ink, whether supplied in traditional solid form or in tubes. *Zheshi* (ocher) and *tenghuang* (gamboge) produce brown and yellow stains, which can be mixed if necessary and used to match *zhuzhi*. In a much stronger concentration they can be used to color brown cover paper. *Huimo* (Huizhou ink) is used to age white paper, giving it a grayish, slightly soiled appearance. It may also be added to ocher and gamboge to produce a darker shade. *Huaqing* produces the rich blue that is used for coloring cover paper.

Dyes are made from raw herbal materials, which are either obtained at traditional pharmacies, where they are used in the preparation of medicines, or gathered in the wild. The most commonly used are the bark of *huangbo* (*Phellodendron amurense*, the Amur corktree), which has been in use since the fifth century and has insecticidal properties; *xiangwanzi*, the acorn cups of *xiangdou* (*Quercus variabilis*, the chestnut oak); and *hongcha* (i.e., black tea, not green, Jasmine, or other types of China tea), of which the most famous variety is Keemun. Less frequently used herbal dyes include *huai* (*Sophora japonica*, the Chinese scholartree), of which the greatest concentration of dye is in the flower buds, followed by the pods, and then the leaves; and *zhizi* (*Gardenia jasminoides*, the Cape jasmine), of which the dried pulp of the fruit is used. (See plate 13.)

• *Preparing and Applying the Colors*

Artists' colors are simply dissolved in water and applied to the paper with a *paibi*. Ocher in solid form must first be finely ground until there is no residue; it is less troublesome to use the ocher paint made for artists which is supplied in tubes. If a darker shade is required, a little Huizhou ink may be added, but add it slowly, constantly testing until a perfect match has been achieved. Huizhou ink is ground on an inkstone in the usual way. Dissolve the pigments in water, and add two parts per hundred each of alum and Canton gum. (I have been unable to find out exactly what Canton gum [*guangjiao*] is, but it has the appearance of gum arabic, whose properties it appears to share.) Spread the paper out on a

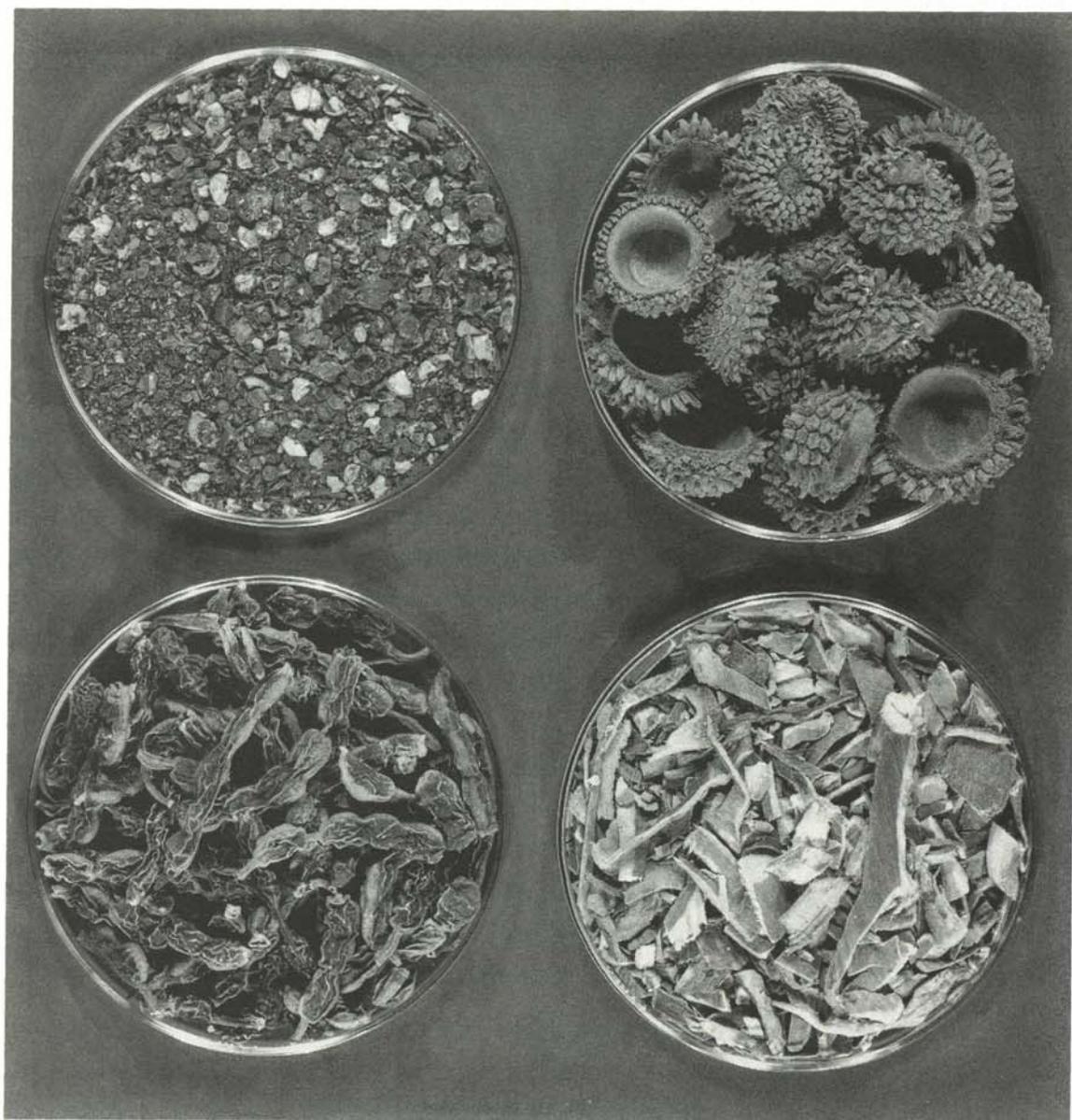


PLATE 13. Herbal pigments. Four herbal pigments not commonly available in the West are (clockwise from upper right) the acorn cups of the chestnut oak (*Quercus variabilis*), the bark of the Amur corktree (*Phellodendron amurense*), the pods of the Chinese scholartree (*Sophora japonica*), and the dried pulp of the fruit of Cape jasmine (*Gardenia jasminoides*). Of these, only the first two are currently in use in the Peking Library workshop, where paper dyed with acorn cups is used to repair bamboo leaves or leaves that have discolored with age, and *Phellodendron* is used to match papers from the Tang and Song that were themselves originally colored with this dye. Scholartree pods produce a bright yellow dye, a color that is often used for title pages and covers, perhaps because this pigment is highly insecticidal. Gardenia produces an orange color, which may be used to color the lining paper of *tao*. The acorn cups and Scholartree pods were gathered from trees growing in Peking, and the *Phellodendron* and *Gardenia* were obtained from Chinese pharmacies in Peking.

wooden board and apply the stain gradually with a *paibi* until the color is as deep as required. Do not apply it all in one go, as nothing can be done if the color is too deep.

Herbal materials should be thoroughly boiled in water, and the alum and Canton gum can be added during the boiling. The bark of the Amur corktree should be ground up finely. Acorn cups need particularly thorough boiling to extract the dye. They should be boiled vigorously for thirty to sixty minutes, and the same batch of cups can be used three times, though obviously the dye will become weaker with each boiling. Acorn dye produces an evenly colored paper of classic elegance, which is slow to fade. Pour the dye into a bath, and holding one edge of the paper with both hands, draw it through the dye one sheet at a time while the dye is still hot; then hang it over a bamboo cane to dry. Dry the paper in batches of three to five sheets, rearranging them as they dry so that the color is even. Unless this is done, the paper will not dry a uniform color.

Dyes prepared by boiling should always be used while they are still hot. If the dye goes cold, it should be warmed up so that all the dyeing is done with the dye at a constant temperature.

• *Coloring Paper for Repairing the Shukou*

The method of coloring *mianzhi* that is to be used for repairing the *shukou* is relatively simple. Take a hundred sheets of *mianzhi* and place them in the center of a wooden board; pour a decoction of black tea or other dye over them, patting it down with the hand until it soaks in thoroughly; then put the sheets aside to dry in a shady, well ventilated place, or hang them over a bamboo cane. After drying, they can be peeled apart and used. Alternatively, they can be separated into batches of ten or so sheets, and after drying a little, further separated into batches of three to five to help them dry faster and more evenly.

Paste

Paste is the most important material used in repairing books, and its quality will affect their life. If it is too weak, it will give way completely after a few years, and all the repairs will fall apart. But if the paste used to repair decayed paper is too strong, the paper will go as wrinkled as a walnut. If the book is thus damaged a second time, the original damage

is compounded, as the book will be impossible to pull apart and repair again. The ancients used a mixture of wheat flour, the juice of *baiji* (*Bletilla hyacinthina* or *B. striata*, the hyacinth Bletilla or common Bletilla) and the sap of the paper mulberry (*Broussonetia papyrifera*) to make their paste. Repairs made with this paste are exceptionally strong, and last for several centuries without coming apart. This kind of paste could be used to repair old Buddhist sutras and other books printed on thick paper. Later, as book paper became gradually thinner, this type of paste was no longer suitable. Paste that contains Bletilla juice is very adhesive, and any repairs made with it are difficult to reverse without trace, even if they are soaked in boiling hot water. It is therefore not suitable for repairing very precious books. Nowadays, we use paste that is strong, but not excessively so, as it is intended for the repair of old books and paper that has decayed and lacks flexibility. So long as books that have been properly repaired with this paste are not stored in a damp place, the repairs will last a long time without coming apart. If you want to reverse the repairs, all you need to do is spray them with water, and the book will not be damaged in the slightest.

The most important ingredient of paste used for book repair is starch, which is extracted from wheat flour. The starch is extracted as follows: use a high grade flour, and add some water to make dough. Knead the dough thoroughly into a large ball, and place it in a basin of cold water. Knead it vigorously in the water with both hands. (You can also wrap it in a piece of fine white cloth before kneading it in the water, so that none of the bran or gluten in the flour gets out.) Knead, press, and wash each pound of dough for about thirty minutes, so that all the starch in the flour is washed quite clean, and settles in the bottom of the basin. The coarse and sticky substance that remains is gluten.

It should normally be possible to wash a starch content of about 70 percent from a reasonably good fine white flour. After the starch has settled in the bottom of the basin, it should be left in a bowl of clean water for three to five days, until the water turns into a thickish yellow soup. Skim this soup off with a clean ladle, replace it with clean water, and mix the water evenly with the starch. After about another three days, the water will have turned light yellow again. Skim it off as before, replacing it with clean water. Repeat this process a couple of times until

the water no longer turns yellow; the mixture is then ready for boiling to make into paste.

The starch can be left in the basin for quite a long time and ladled out as required for making paste, but in warm conditions wet starch easily ferments and smells foul. To prevent this, ladle it out to dry, and when you want to use some, mix it with water in the following proportions. Use a pair of scales to weigh out the ingredients, so that the paste will be of the right quality. The standard formula is 1 kilogram starch to 4.5 kilograms water, to which 3 grams alum may be added to prevent the paste from going off.

To make the paste, first soak the starch in half the water, so that it resembles a thin gruel, then strain out the sediment with a wire sieve. Pour the rest of the water into a pan with the alum, bring it to the boil, then add the strained starch, stirring continuously with a wooden spatula. After five or six minutes, the paste will turn a semitransparent silvery white; it is then cooked. Ladle it into a basin of cold water so that it is completely immersed, and it is ready for use.

The time taken to boil the paste will depend on the strength of the flame. It should not be too high, or the paste will be brittle when it dries and lacking in adhesiveness. Nor should it be too low, or the paste will turn completely white, instead of the semitransparent silvery white, and will easily disperse and also lack strength.

After the paste has been cooked and immersed in cold water, it will be good for ten days or more in warm conditions, and for one month in cold conditions. When you want to use it, transfer some to a small basin with a ladle; never touch it with your hands or anything that is not clean, or it may get contaminated with mold. Mash it smooth with a wooden pestle, and slowly add some cold water until it looks like milk; the paste is then ready to use.

The consistency of the paste is measured on the Baumé scale, and for general purposes it should measure two degrees.

When you mash the paste and dilute it with water, you should add the water very slowly. If you add it too quickly, the paste will be lumpy and of an uneven consistency. In winter, first immerse the paste in boiling hot water; then it will be easy to mash smooth.

The consistency of the paste depends on the thickness of the paper

that is to be repaired. For papers such as thick *mianzhi* and *maobianzhi*, the paste should be on the thick side or it will not be strong enough to hold the repairs securely together. For thin *mianlian zhi*, *kaihuazhi*, *maotaizhi*, and so forth, a rather thin paste should be used or the paper will crinkle. For decayed paper that has lost all its flexibility, thin paste must be used, as too thick a paste will cause the brush to drag the paper with it when the paste is applied, and thus damage the leaf.

Thin paste should be made up fresh each day, and the leftovers not kept overnight, or the paste will ferment and lose its adhesiveness. Sometimes, when you have been using the same pot of paste for a long time, it will get stained with ink from the leaves you are repairing, and contaminated with dust; it will then, in turn, soil the other leaves. Be sure to use clean paste, especially when repairing white *kaihuazhi*, ideally changing it once or twice a day.

When repairing old books, you should always use paste that you have made yourself, and never the sort that is sold in shops, as this may contain chemical preservatives that may have an adverse effect on the paper. If you only need such a small quantity of paste that it is not worth making your own, be sure to buy one of the highest archival standard, and be sure you know exactly what chemicals it contains as well as their effects.

REPAIRING PAPER

A book may have been handled carelessly, and various things spilled over it, or the paper may have yellowed with age. Attack by insects and rodents may have left the paper riddled with holes. Fire and flood may have left the paper yellow or water stained. In severe cases, all the leaves may be matted together in a solid block, or the paper may have been attacked by mold, causing it to lose its substance and go fluffy. An old book may have been left in the sun, or exposed to smoke and heat, so that the leaves resemble tobacco leaves and disintegrate at a touch. In other cases, constant thumbing through may have caused the *shukou* to split open into two separate leaves. A book may have been damaged by substandard binding, and the head and tail margins trimmed too closely or aligned unevenly. Each of these various types of damage calls for different treatment.

This section therefore discusses first the basic techniques of paper repair, and then the repair of more specific types of damage.

Preparation

The book must first be thoroughly examined to determine the nature and extent of the damage, as well as the quality of the edition, before the method of repair can be decided. With ordinary books, the repairs should be strong and durable, and designed for convenience of use; but in the case of fine and rare editions, the workmanship should be of a special order, and care taken to preserve the character of the original. Appropriate materials and tools, paste, paper, and so forth should also be prepared, and laid out on the bench in the correct position for the repair to be undertaken, so that they are conveniently accessible.

Basic Repair Techniques

CLEANING

Different methods of cleaning and restoration are employed according to the nature and extent of the staining. The two methods described below can both be used to clean general water-based stains. Method two is the more convenient. When drying the leaves in humid conditions, be sure to replace the interleaving sheets frequently, or mold will develop. To prevent decayed paper from disintegrating, each leaf must be individually wrapped in clean white paper before applying the boiling water.

• *Method 1*

To remove water-based stains and yellowing, the leaves are washed. First obtain a basin wide enough to accommodate a wooden board eighty centimeters long and thirty centimeters wide. Place a piece of thick paper over the board. Remove the covers and endpapers of the fascicle, and spread the folded leaves on the board starting from the lower end, with the folded edge uppermost (see figure 1). Prepare a solution of twenty grams of soda to two kilograms of water, boil it, and with the board held at an angle in the basin, pour the solution over the leaves straight from the kettle, from top to bottom (figure 1). Alternatively, spread the leaves on the board starting at the top end, and pour the

solution over them from bottom to top (see figure 2). To get the leaves completely clean, the solution can be ladled over them again from the basin. Then rinse them once or twice with clean water to remove all traces of the soda. This done, cover them with a sheet of thick paper, turn them over and drain the water off, and place them on the table. Very carefully, lift the leaves off one by one, taking them by the side margin with a pair of tweezers, and pile them in order on a piece of blotting paper. Every four or five leaves, insert a sheet of clean paper, and when you have finished, cover the pile with a piece of cardboard and weight it down at each end with a stone. Replace the sheets of paper with dry ones a couple of times a day until the leaves have dried out.

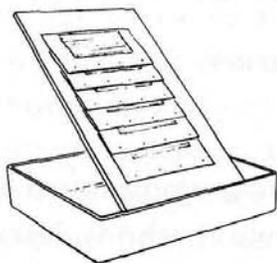


FIGURE 1



FIGURE 2

• *Method 2*

First place a sheet of thick paper in the bottom of a metal basin about twenty centimeters deep and spread the leaves on it one by one, treating one or two fascicles at a time, up to about one hundred leaves. Scatter fifty grams of powdered soda over the pile, or add it to the kettle, then carefully pour the boiling water over the leaves, or around them. Do not pour it on too vigorously, or the paper will disintegrate. When the leaves are covered with water, press them down a little with a wooden spatula so that the water soaks right in. When the water has cooled, remove the plug and let it out. Rinse the leaves two or three times with fresh water to remove all trace of the soda. Then separate and dry the leaves as in method 1.

• *Other Stains and Points to Note*

When washing the leaves of manuscripts, examine the color of the ink carefully to determine whether freshly made ink has been used or ink that has been allowed to stand for a long time in advance of use. Test one leaf with water to see if the ink dissolves or runs. Sometimes an entire manuscript may have been written in ink that has been allowed to stand, or in the worst cases, freshly made and old ink may have been used on the same leaf. Ink that has been allowed to stand runs and blots easily, so to prevent this from happening, add a little alum to the water, and let the water cool before pouring it over the leaves.

These washing methods must never be used on manuscripts executed on red or blue framed paper, or in red or blue ink, as these colors will certainly run.

For very bad water-based stains, oil-based stains, and mold or ink stains that cannot be removed completely by the above methods, make two solutions: solution one, three parts potassium permanganate to ninety-seven parts water; solution two, five parts oxalic acid to ninety-five parts water.

First moisten the stain with water using a brush, then apply solution one and leave for a minute or two; then apply solution two and the stain will disappear. Although potassium permanganate and oxalic acid will remove mold stains effectively, if too much is used they will damage the paper.

In the case of very persistent stains and white paper with areas of rather bad discoloration, it was formerly the custom to use bleach. Although bleaching was only carried out when absolutely necessary, and always with great caution and due regard to the value of the book, owing to its corrosive effect on the paper, which could cause the leaves to disintegrate if they were left in the solution too long, the practice has now been entirely discontinued.

Minor water-based stains can be removed by applying water. This is very easy, and is carried out as follows: dip a brush into a basin of boiling water and apply it to the stain; then spray a little cold water around the stain. Press the leaf between sheets of clean paper, and when it has dried, the stain will have dispersed into the area that was moistened.

To remove candlewax, place the affected leaf between two or

three sheets of blotting paper, and press it with a hot iron, so that the grease will melt and be absorbed by the blotting paper. The blotting paper should be changed frequently; otherwise the grease will not be absorbed properly.

REPAIRING THE *SHUKOU*

• *Purpose*

When a book has been subjected to many years of constant use, the *shukou* is apt to split open, forming two single leaves; these should be joined together to restore the book to its original state and make it convenient to use. Sometimes, although the *shukou* may not have split open, it may have worn thin and be on the point of doing so; or the tail half may have split open while the head half remains intact. When a book has been interleaved, or, in cases where the head and tail margins are too short, its form greatly altered by binding it in the *jinxiangyu* ("jade set in gold") format, the *shukou* is easily damaged and ought to be reinforced irrespective of whether it has actually split open; the extra layer of thin paper in such cases will help to strengthen it. Repairing the *shukou* is an essential preliminary to the repair of the rest of the leaf; no matter how damaged the rest of the leaf may be, the *shukou* must be repaired first. Unless things are done in this order, it will be difficult to match up the two halves of the leaf evenly, as the paste used in the repair will distort the paper.

• *Preparation*

Before starting the repair, in addition to taking the book apart and getting ready the sheets of waste paper, paste, and so forth on the bench, strips of *mianzhi* one centimeter wide and as long as the leaves to be joined should be prepared. Place the strips on the right-hand side of the bench, and be sure to cut them with the mold patterns aligned vertically. White leaves should be repaired with plain white paper, such as Henan or Shanghai *mianzhi*. If the *shukou* of books printed on *zhuzhi* paper are damaged, paper that has been colored to match should be used to effect the repair. The same goes for books that have yellowed with age. If plain white paper is used in such cases, the white *shukou* will clash with the yellow leaves, and the result will be extremely unsightly.

• *Method*

Open out the leaf and place it text downward on a pasteboard with the two halves matched up. Make sure that they are not too close and that the fibers do not overlap, or after the leaf has been folded, the fibers along the folded edge will be uneven. Hold the *shukou* down with the middle finger and thumb of the left hand, so that it cannot move. First repair the places at the head and tail of the *shukou* that have worn away, using matching paper. Then holding the brush in the right hand, apply thin paste evenly in a column one centimeter wide, working from the center to the head of the leaf, and then to the tail. Take a strip of *mianzhi*, head in the right hand and tail in the left, and lay it over the *shukou*. Put a piece of blotting paper over it, and smooth it with the palm of the right hand so that it sticks down firmly and evenly. Pick up the leaf by the tail edge, using both hands, and place it on another pasteboard. To avoid soiling the leaf, use either a freshly covered pasteboard, or an old one with a sheet of clean white paper spread over it. Then proceed to the next leaf.

• *Problems*

Some papers distort very rapidly when moistened, owing either to the materials of which they are made or the method of their production. For example, it is exceptionally difficult to repair the *shukou* of books printed by the publisher Min Qiji (1580–after 1661) of Wuxing in the late Ming on the hypersensitive paper he used. As soon as you have applied the paste, the paper expands considerably, and the *shukou* crinkles. If you first spray water over the whole leaf and then apply the paste thinly, the leaf will lie flat and not crinkle, but on drying it will contract to its original size, whereas the strip of paper that has been used to effect the repair will contract to a different degree, so even when the book has been beaten down, the result will be unsatisfactory. Practical experience of this type of paper will reveal that the only solution is to work extremely fast.

Before starting the repair, lightly spray the pasteboard with water: since it will have been used in previous repairs, traces of paste will be left on the surface, which on being moistened, will prevent the leaf from slipping. Spread out the leaf, match up the *shukou*, paste both sides quickly, stick the strip on quickly, smooth it with blotting paper, and

you will have completed the repair before the paper has had a chance to expand. Make sure that the paste is a little thicker than would be used in normal repairs, as its water content will be less and it will be absorbed more slowly.

• *When the Shukou Is Difficult to Match Up*

If the *shukou* is badly worn away, it will be difficult to match it up properly when making the repair. To ensure that the repair does not result in the *shukou* of the leaf being of uneven width, first take one of the better leaves and spread it out on the pasteboard, and draw a line all around it. Arrange the damaged leaf so that the edges are flush with this line. First fill in the damaged or missing areas near the *shukou* with matching paper, then join up the leaf with the strip of *mianzhi*. In this way, the *shukou* will be of uniform width.

• *Repairing the Shukou of Red or Blue Framed Paper*

When red or blue framed paper has been used, whether in manuscript or printed books, there is a danger the colors will run if any moisture permeates completely. To prevent the paste from soaking in, apply it to the strip of *mianzhi*, and not to the leaf, and then stick it over the *shukou*. This may seem easy, but it is in fact an awkward operation. If you only apply a little paste, the *shukou* will not stick together properly, but if you apply too much, it will soak into the leaf. So first try mending one of the less conspicuous leaves to ascertain the exact amount of paste needed to achieve a firm join without soaking in. Or you could use thin paste and add a little alum, which will prevent the water in the paste from soaking into the paper. When repairing the *shukou*, if you don't intend to interleave the sheets, or if the interleaving is difficult to beat down because the paper is thin, after applying the paste to the leaf, instead of using a cleanly cut strip of *mianzhi*, lay a large piece of *mianzhi* over the *shukou*, the mold pattern aligned vertically with it, and then tear it away down the edge of the pasted column. Whereas it is difficult to beat down the edge of a cleanly cut strip, because the page fibers all overlap in the same place, with the ragged edge of a torn strip, where the fibers overlap at random, the process will be relatively easy.

REVERSING UNSATISFACTORY REPAIRS

• *Types of Unsatisfactory Repair*

Although a book may have been repaired, the work may not have been done skillfully, or shortcuts may have been taken for the sake of convenience: the color of the paper used in the repair may not have been matched carefully enough with that of the book; or in repairing the leaves, the two halves may not have been pasted together evenly. Paste may have been used incorrectly; or if the leaf has been lined, the paste may have been applied unevenly, giving it a multilayered appearance (actually, this is caused by the leaf not adhering properly to the lining paper, so that it looks hollow). All these factors affect the beauty of the book. Furthermore, a leaf may have been lined with thick paper even though it was not particularly damaged, making it stiff, awkward to turn, and attractive to insects. In all these cases, it is necessary to reverse the old repair and start again. There are two methods.

• *Soaking Off*

First take the book apart, and spread the leaves out in a shallow sink, one at a time. If the paper is old and has lost its strength, cover each leaf with a sheet of white paper to avoid damaging it. Then pour hot water over the leaves, which will release the adhesive so that the lining can be separated from them. Only allow the leaves to remain in the water for as long as necessary to achieve the required degree of saturation. This done, remove the plug from the sink and let the water drain away. The following day, carefully remove the lining paper from the leaves with tweezers.

Before pouring the water over the leaves, as when using water to clean soiled leaves (see "Cleaning," above), be sure to check that the ink is not fugitive.

• *Rubbing Off*

Sometimes, the paper is very old, or particularly thick paste has been used in lining it, so that the lining paper is difficult to remove. In such cases, the lining paper can first be sprayed with water, and then gradually

rubbed off with the middle finger of the right hand. If the paper dries, spray it again and continue to rub it off until it has been completely separated from the leaf.

LINING

Lining is basically not a sound practice, as it stiffens the paper and reduces its flexibility. The extensive use of paste also makes the book attractive to insects. But in the case of very old paper that has gone brittle, or when there is such severe worming over the whole leaf that it is impossible to know how to set about the repair, there is no alternative to lining.

• *Preparation*

Place a varnished wooden board on the bench, sixty centimeters long and forty centimeters wide, or a little larger than the leaf to be lined. If a lacquered lining table is available, so much the better. Place a bowl of thin paste on the top right of the board, the leaves on the right side, and the lining paper on the left. When everything is ready, proceed as follows.

• *Method*

First lay a strip of moistened oiled paper across the lining table or wooden board. (The oiled paper is moistened so that it comes off easily from the table or the text paper. Mylar, kraft paper, or polythene may be used instead.) The height of the oiled paper should be one-third the height of the leaf, and it should be a little wider than the width of the leaf. Open out the leaf and place it text downward on the oiled-paper strip, with the tail part over the oiled-paper strip. Take a *paibi* in the right hand, and apply thin paste evenly up and down across the leaf, starting with the *shukou* and working up and down to the left and right, so that the leaf is pasted flat. Take a dry sheet of the lining paper with both hands and align it with the tail edge of the leaf, and lightly brush it down once with a dry *paibi* so that it sticks to the leaf. Using both hands, pick the leaf up from the tail part by the oiled-paper strip, turn it over, and lay it on a sheet of blotting paper prepared in advance; then remove the strip

of oiled paper. Lay another sheet of blotting paper over the leaf, and rub it down firmly with both hands. Then remove the blotting paper, put the leaf aside, and proceed to the next one. Wipe off any paste that may be left on the oiled-paper strip with a damp cloth, and after having lined a dozen or so leaves, change the damp sheets of blotting paper for dry ones. When all the leaves have been lined, hang them one by one over a bamboo cane to dry; then spray them with water and flatten them. (See "Spraying," below.)

• *Types of Lining Paper*

Only thin *mianzhi* should be used for lining, whether the leaves to be lined are printed on *mianzhi* or *zhuzhi*. Where old paper is concerned, the *shukou* should be reinforced before the leaves are lined. The lining paper should be slightly larger on all four sides than the leaves to be lined. The lining paper has a rough and a smooth side; the smooth side should be applied to the leaf. This principle also applies to other repairs; the smooth side of the *mianzhi* is used.

• *Fugitive Inks*

When lining manuscripts or books printed on red or blue framed paper, a little alum may be added to the paste to prevent the ink from running. If it appears that this is not going to work, then the following method, whereby the lining paper is pasted, can be used.

• *Pasting the Lining Paper*

In this method, a sheet of dry paper is laid over the pasted lining paper to absorb the water content of the paste; then, while the lining paper is still damp, it is placed on the leaf. The leaf is then put between sheets of paper and rubbed down with a *zongshua* so that the lining paper adheres to it, and the sheets of paper absorb the remaining water content of the paste, preventing the ink from running.

Another method is to spray a coat of polymethyl methacrylate onto the printed side of the leaf; then no matter how the leaf is lined, the ink will not run. However, as polymethyl acrylate is a modern chemical product, it is not yet known whether in future it may have

some adverse effect on the book, so this method should only be used for lining ordinary books, and is not suitable for rare old editions.

SPRAYING AND FLATTENING

- *Spraying*

The point of spraying is to relax the paper. When a leaf has been repaired or lined, the paste will have caused it to crinkle. It must therefore be sprayed to relax it.

Arrange the leaves that have been repaired or lined in staggered batches of five or six sheets, place them on a sheet of blotting paper, and spray them with either a sprinkler or an atomizer. But do not get them too wet, as the paste is easily released and the repairs may come apart.

- *Drying between Sheets of Paper*

When you have sprayed three or four batches, lay a sheet of blotting paper over them and rub them down with both hands. When they have all been treated, pile all the batches up with a sheet of blotting paper at the top and bottom of the pile (it must be perfectly clean, as dirty marks may contain mold, which could be transmitted to the leaves of the book), and put the pile between two pasteboards on the bench. First press it down lightly so that the moisture is absorbed into the whole area of the leaves. Turn the leaves over once; then weight them down firmly by placing a heavy weight at each end of the pasteboard. Turn the leaves over once a day to ventilate them and help them to dry out.

- *Turning Over*

The leaves should be taken one by one from the top of the pile and turned over, and the quality of the repairs examined at the same time. If any are found to be unsatisfactory, they can be redone promptly. The number of leaves in each batch should be different — for example, five in the first, four in the second, and five or six in the bottom ones, so that the damp batches alternate regularly with the drier ones. Later, they can be turned over, starting with the last batch.

If the leaves of a book are rather dirty, repairing the *shukou* or

other parts of the leaves may produce tide marks. These can be removed by spraying them evenly with hot water.

RETRACING THE TEXT FRAME

Occasionally, parts of the text frame or even the text itself may be missing, making the book inconvenient to use. It used to be the custom to restore missing parts of the text frame, and faithfully copy out the missing text from an identical edition in the same calligraphic style as the original. Although in accordance with modern attitudes toward preservation the practice has now been completely discontinued, for documentary purposes an account of how the process used to be carried out is included.

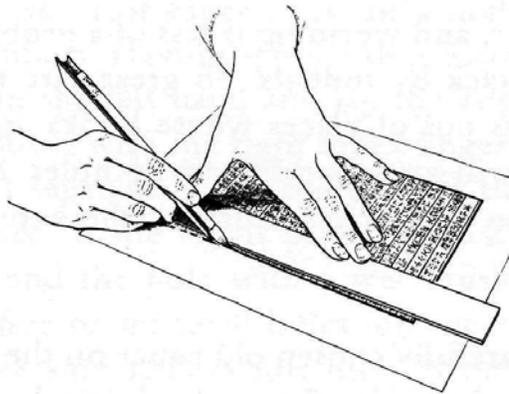


FIGURE 3

Open out the defective leaf on the bench, with a sheet of paper under it, and hold a straightedge against the part where the text frame is missing. Use freshly made ink (never bottled ink or ink that has been allowed to stand, as they are apt to run), a fine writing brush, and a brush holder. Lay the brush in the brush holder, and hold them together in the right hand. Before tracing the line, test the color of the ink on some white paper to make sure it is a good match, and mark the corner of the text frame with a small piece of paper or a pinprick. Hold the straightedge firm with the left hand, and trace the line by moving the brush holder together with the brush down the straightedge, from head to tail, with the right hand (figure 3). A fine line may be traced with one stroke,

but for a thick line, first trace the outer edge, then fill in the middle, so that the restored text frame is exactly the same width as the original.

After tracing the line, rub a little dust, baked mud, tobacco, or similar substance into it, so that it does not look too new and blends in perfectly.

Repairing Specific Types of Damage

ATTACK BY INSECTS AND RODENTS

• *Causes*

Attack by insects and rodents is caused by bad storage. For example, if books are kept in places where the air cannot circulate freely, or that do not receive adequate sunlight, sooner or later insects will appear. This happens quite frequently in southern China, with its damp climate. In the north it is drier, and worming is less of a problem, but the books are just as liable to attack by rodents. So great care must be taken to keep insects and rodents out of places where books are stored, or a book in perfect condition will soon be riddled with holes. An appropriate method of repair should be chosen according to the extent of the damage.

• *Preparation*

First place some carefully chosen old paper on the bench, and some thin, well-mixed paste; then take the papered pasteboards and place one on the top left of the bench, and the other in the middle, close to yourself. Take the book apart and place it on the right of the pasteboard. If the book is very tattered, lay a sheet of paper over it, so that the leaves are not accidentally blown or brushed away.

• *Holes at the Edge of the Leaves*

Take the leaf to be repaired and lay it text downward on the pasteboard. If there is any insect excrement in the damaged area, either scrape it off with a small knife or rub it off very gently with sandpaper, in such a way as not to damage the text, so that the fibers are exposed in the area around the damage. Holding the brush in the right hand, apply thin paste around this area, lightly and evenly, applying neither too much, nor over too wide an area; with the left hand, lay the paper over the area that has

been pasted. If the hole is very large, make sure that the mold pattern of the paper used in the repair is aligned with that of the leaf, so that it will lie flat when the repair is finished.

• *Edging Paper*

When repairing the edges of a leaf, the edges of an old piece of paper should be used to achieve a uniform match. Owing to the effect of light, the edges of the book are never the same shade as the inside, so that if paper that has been matched with the inside, however well, is used to repair the edges, the result will not be harmonious, and it will detract from the beauty of the work; care should be taken in this matter.

• *Holes in the Body of the Leaf*

If you are using a new sheet of paper to repair a hole, first tear off the edges to draw out the fibers. Having applied thin paste around the hole, take the repair paper in the left hand and lay the edge over the pasted area; then, holding it down with the right index finger, tear it away with the left hand, so that it separates along the edge of the moistened area, leaving the hole repaired. If the repair paper is thick and will not part easily, trace a line around the hole with a wet brush, and then tear it away. After repairing five or six small holes, or one rather big one, lift the leaf a little to make sure it does not stick to the pasteboard; then repair the rest. If there are holes over the entire leaf, first repair the central portion, then the tail and the right; turn the leaf round and then repair the right and the tail; this is the proper order in which to do it. When the whole leaf has been repaired, turn it over and press the repairs down firmly with the right palm, and lay the leaf on the other pasteboard, which was placed on the top left of the bench, and proceed to the next one. When the second leaf has been repaired, lay it over the first one, but do not align the leaves; continue this way in batches of four or five leaves, until the whole fascicle is finished.

• *Points to Note*

In repairing leaves that have been attacked by insects and rodents, we are usually dealing with rare and valuable books and should be constantly striving to improve our skill. If a repair is bad, it compounds the original

damage and makes a second repair even more difficult. As the old book collectors used to say, if you can't find a good craftsman, better leave things as they are. Also, the paste should be mixed properly: not too thin for a heavy paper, and not too thick for a light one. If too thick a paste is used, the paper easily crinkles, and it is difficult to make it lie flat. Too thin a paste, however, will not be strong enough. So mixing the paste to the right consistency directly affects the quality of the repair.

When repairing holes, start with the big ones and then do the small ones, or the paper will *crinkle and be difficult to flatten*. If insect holes are very close to each other, repair them all with a single piece of paper, because if you try to repair them individually, the repairs will overlap and build up too much thickness.

REPAIRING HOLES LEFT BY THE EXCISION OF SEAL IMPRESSIONS

In Chinese bibliography, the term "seal" is not used in the same way as in Western bibliography. It does not refer to an impression in molten wax, whether hanging from a document by a ribbon or applied directly to the paper, which is used to denote authenticity; rather, it refers to a red stamp applied to the book to denote ownership, something like a modern library stamp. Such seals are usually applied to the first page of the first chapter of the book, but are often found on the first page of every section of the book, including each preface, chapter, and fascicle. The seals are applied to the printed area, often over the text itself, and an old book may have half a dozen or more on a single page.

When repairing holes left by the excision of seal impressions, more care than usual should be taken over the selection of matching paper. As seals are always applied to the most conspicuous parts of the book, the least difference in shade between the leaves of the book and the paper used to effect the repair will be immediately noticeable. If no suitable paper can be found, a strip can be torn from one of the margins of the book itself that is concealed in the binding. One way of setting about the repair is to tease out the fibers around the edges of the hole with a small knife, align the mold pattern of the repair paper with that of the leaf, and then apply thin paste around it and make the repair. Another way is to lay a sheet of matching paper under the hole, again

with the mold patterns aligned, and place a board underneath it made of softwood such as Chinese linden, poplar, willow, or other wood that is easily indented. Hold the leaf down with a straightedge, and trace a fine line around the edges of the hole with a large needle so as to form a piece of repair paper exactly the same size as the hole. First paste a strip of paper over the front of the leaf to hold the two together. Then turn over the leaf and apply some thin paste around the edges of the hole and the repair paper, and fix the repair paper in place with thin strips of *mianzhi*, smoothing it down with the finger. Turn the leaf over again, and remove the strip of paper pasted over the front. Spray the leaf; then place it between two sheets of paper and weight it down for a couple of days until it dries. With this method, because the fibers of the leaf and those of the repair paper do not overlap, if the papers are identically matched, the repair is very difficult to spot.

WATER DAMAGE

• *Drying out a Complete Fascicle*

When a book that has gotten wet is discovered immediately, it is relatively easy to open, and it will not be necessary to take it apart. Lay a complete fascicle flat on a table, turn the leaves over one by one with a bamboo knife from beginning to end, and place each fascicle separately on a spare table in a shady, well ventilated position. When the fascicles are about 90 percent dry, pile them together with wooden boards on top and underneath, and either put them in a press or place a heavy weight on top of them; they will be flat in a few days.

• *Separating the Leaves with a Bamboo Knife*

If a book is not discovered until a long time after it has gotten wet, many of the leaves may have stuck together and it will be difficult to open them so there is a danger of damaging the text. In such cases you should first examine the book to see whether it is an ordinary one, or a rare and valuable book. If it is an ordinary book and the paper is not brittle, take the fascicles one at a time and roll them with both hands until they are supple; then open them very gently leaf by leaf with a bamboo knife or tweezers. If a small fragment should come away from the leaf, you should

then and there stick it back in place with thin paste, so that not a single character of the text is lost. If the book is rare and valuable, or if the paper is brittle, you should on no account roll it with the hands. Undo the stitching, remove the covers and endpapers, and carefully peel off the leaves one by one.

• *Soaking the Leaves Apart with Boiling Water*

Sometimes a book is badly soaked with water that contains some sticky substance, or the ink with which it is printed contains gum, so that when the leaves are wet they stick together in a solid block. In such cases it is not easy to separate them whether they are dry or wet. Make a solution of boiling water with three parts per hundred of alum (to preserve the blackness of the ink) and two parts Canton gum (to strengthen the paper), and immerse the book in it for a couple of days until it is thoroughly soaked and the leaves can be opened out. Place them on blotting paper in batches of five or six to dry. If any leaves need repairing, use the methods given above for attack by insects and rodents.

• *Steaming the Leaves Apart*

If, having tried the above method, you still cannot get the leaves apart, you can use the steaming method. First soak the book in boiling hot water, then wrap it in clean paper and put it in a bamboo food steamer. Leave it on the stove for several hours so that the steam can thoroughly penetrate the leaves and loosen the adhesive that is sticking them together. It is essential to open the leaves out as the steaming is in progress, because as soon as they cool they go solid again and cannot be separated. This method is not very effective with thin paper, and is unsuitable for very old *zhuzhi* which has lost its flexibility.

DECAYED PAPER

If books are not stored properly, they sometimes get damp and decompose. Although the leaves will open, the paper is decayed and portions of the text will have rotted away; the slightest touch causes the paper to disintegrate. Such leaves need lining, but the method differs from that used to line leaves that have been attacked by insects or rodents, and

different paper is used. To line decayed leaves, use thin *mianzhi*, which has great tensile strength. First repair any damaged areas with matching old paper, not on the pasteboard but on a sheet of oiled paper (or polythene). Take the leaf very gently with a pair of tweezers and place it printed side down on the oiled paper; sprinkle it a little to moisten it. Before you sprinkle it, weight it down with a straightedge so that it does not get blown away by your breath, a cough, or drafts. If the leaf is creased or dog-eared, apply some water with a brush and flatten it out. Repair the damaged areas using an even application of thin paste and matching paper. When repairing holes, leave the repair paper a little larger than usual so that it overlaps well. Having completed the repairs, paste the whole leaf thinly and evenly with a *paibi*, and line it with a sheet of thin *mianzhi* slightly larger than the leaf. With both hands, take the leaf by the tail edge, turn it over, lay it on a sheet of blotting paper, and remove the oiled paper. Lay another sheet of blotting paper over the leaf and rub it flat with both hands. Put it aside on a pasteboard; then proceed to the next leaf in the same way.

Another way to repair decayed paper is as follows. Fix a piece of oiled paper to the bench and wipe it clean with a damp cloth. Place the damaged leaf text downward on the oiled paper, and, using tweezers, straighten out any damaged portions of the text or text frame. When these have been repaired, paste the leaf thinly and evenly with a *paibi*. Take a sheet of thin *mianzhi* in both hands, and lay it over the leaf from head to tail. Cover it with a piece of blotting paper, and rub it flat with a *zongshua* so that the thin *mianzhi* adheres firmly to the leaf. Then separate the leaf from the oiled paper. If any paste has got onto the oiled paper so that the leaf will not easily part from it, gradually ease the leaf off with a brush dipped in water.

If the decayed paper to be repaired is thick, so that from the back you cannot see clearly whether the text is correctly positioned or the text frame is straight, first place the leaf text upward on a sheet of blotting paper, and arrange it properly. Then lay the moistened sheet of oiled paper over it, and turn the whole lot over. Smooth it down a few times; then carefully remove the blotting paper, leaving the leaf stuck to the oiled paper. Because the oiled paper has been moistened, it will already be fixed to the bench; continue the process as above.

The paste used for lining decayed paper should be thin, and it should be applied generously and lightly. If the paste is too thick and you apply it clumsily, you might brush the leaf askew or even take a piece out of it. When the paste is applied generously and lightly, the brush will glide easily over the surface of the leaf. Sometimes when a book has decomposed after having gotten wet, although you line the leaves properly, the fibers on the text side of the leaf bulge out and detract from the beauty of the book. This can be remedied by applying watery paste containing two parts per hundred of Canton gum to the surface of the leaf with a *paibi*. After the leaf has dried, its original flexibility will have been restored, and it will lie completely flat.

BRITTLE PAPER

If a book has been kept on an exposed shelf or a desk for a long time, or has suffered from smoke or heat, the paper may have gone brittle so that it disintegrates at a touch. In severe cases, the leaves may resemble tobacco leaves. To repair such damage, different methods are used according to the degree of brittleness.

- *Slightly Brittle*

Water can be poured over the leaves to get rid of the brittleness. After the water has been applied, the paper softens, and minor repairs can be carried out to any damaged leaves. Again, be sure to check that the ink is not fugitive before soaking the leaves.

- *Very Brittle*

The same method can be followed as for lining decayed paper. First repair any damaged areas with matching paper; then line the leaf. The lining paper should be thin and have the quality of *mianzhi*. It is best to use a lacquered lining table, but if none is available, you can work on a varnished wooden board placed on the bench. If the surface of the bench is narrow and there is not much room to put anything, first open out the leaves and stack them alternately between sheets of paper. Lay a leaf on the varnished wooden board, and place a strip of strong paper underneath it about ten centimeters high and a little wider than the width of the leaf (oiled paper or polythene may both be used). The paper strip should be

constantly rinsed, or any paste that gets onto its surface could easily adhere to the leaf and lift off the lining paper. Paste the leaf thinly and evenly with a *paibi*; line it with a sheet of paper; using both hands pick up the leaf with the paper strip; lay it on a sheet of dry paper; put another sheet of dry paper on top of it; and smooth it flat with the hands.

If the leaf is very badly damaged, line it with a whole sheet of identical paper, and when it is dry, put an extra layer of paper on the back of the leaf over any holes to avoid a bumpy, uneven appearance.

If the edges of the leaf are brittle but the central part is sound, it is not necessary to line the whole leaf. Using thin paste, just line it around the edges with strips of *mianzhi*. Because there is an extra layer of paper around the edges, there will be a depression in the center when the leaf is dry. Using the technique of interleaving (see "Interleaving," below), insert a sheet of plain paper into each folded leaf and it will be easy to press the leaf flat. The reason for interleaving rather than lining the whole leaf is that interleaving makes the leaves more flexible, whereas lining them makes them strong and stiff, like thin cardboard. Interleaving, therefore, is almost always preferable to lining.

Leaves that are torn or split can be repaired with strips of *mianzhi* and thin paste. If a leaf has broken into many pieces, first put it together text upward, and temporarily paste a strip of paper over it. Then turn it over and repair the back. When the repair has been done, turn the leaf over again and remove the strip of paper from the front. If the strip has dried and will not come off easily, spray it a little. In this way, you can avoid piecing the leaf together unevenly.

NARROW MARGINS

If a book is incomplete and missing leaves are supplied from another copy, they may be shorter than those of the original book. To make them the same size, either the framing method or the edging method can be used.

• *The Framing Method*

Tear away the blank paper from all four sides of the leaf outside the text frame by making a crease, holding the leaf down with the left hand, and tearing the blank border away with the right hand, from left to right.

Then tear away the other borders. Alternatively, you could tear them off with a small paper knife. Do not cut the paper, as the projecting fibers around the edges must be retained, so that they blend in invisibly after the repair. If the leaf is cut with a knife, the resulting edge is sharp and there are no projecting fibers, leaving an obvious trace of the repair. When the edges of all the leaves in the book have been torn away, take a leaf and place it on the pasteboard text downward. Apply thin paste around all four edges of the leaf. Lay a sheet of paper over the leaf, slightly larger, but of the same color and thickness. Trace a line around the edges of the border with a moistened brush; then remove the paper within the border with a large needle, along the moistened line. Lay a sheet of thick paper over it and smooth it down with the hands, so that the paper frame sticks firmly to the back of the leaf all around the edges. Deal with the rest of the leaves in the same way. As this method uses rather a lot of old paper, it is not suitable if this is in short supply.

• *The Edging Method*

Select some paper similar to that of the book, and cut it into strips of suitable width, the same length as the width of the leaves. Take the leaves, the borders torn off, and lay them text downward on the pasteboard, staggered from the bottom upward by about three millimeters, in batches of about ten. Place a sheet of white paper at the top and bottom of each pile to prevent the paste from going where it is not wanted. Thinly paste the staggered edges of the leaves, then remove the sheets of paper at the top and bottom. Take the strips of paper one at a time and stick them to the edges of the leaves, working from bottom to top. When you have finished the whole batch, lay a sheet of clean paper over it, and smooth it down with the hands. Rearrange the leaves so that you can deal with the other edges in the same way. Having dealt with the head and tail edges, proceed to the sides. When the first batch has been completed, proceed to the second, and so on until the whole book is finished, when it can be dried. The edging method is not only more economical in its use of paper than the framing method, but it is also faster. Its disadvantage is that after the repair is finished, the edges of the strips can be seen in the *shunao*.

LEAVES WITH TEXT ON BOTH SIDES

The method used for repairing leaves with text on both sides is completely different from that used for repairing leaves with text on one side only, as the latter can be repaired on the back without affecting the text on the front. In the case of leaves with text on both sides, there is no difference between front and back. If there are any places with no text around the edges, they can be repaired with strips of transparent paper, but if there are any damaged areas on the text, the strips of paper would obscure the text and affect its legibility. The solution is to split each leaf into two single leaves, and repair or line them by the usual methods.

The way to split the leaf depends on its size. Prepare two pieces of coarse plain white cloth a little larger than the leaf, and paste them all over with thick paste using a *zongshua*. Press the leaf between the two pieces of cloth, and with a sheet of blotting paper above and below, smooth it down very firmly with a clean *zongshua*. When the paste has dried, pull the pieces of cloth apart with both hands, and the leaf will split into two halves, each stuck to one of the pieces of cloth. Soak the cloth in a basin of water so that each half-leaf can be separated from it; then place the half-leaf on a varnished board and remove the paste from its surface with a moistened brush (or first scrape it off with a knife). Then repair the half-leaf in the usual way. After they have dried, the two half-leaves must be put together again. Line them up back to back and weight one side down with a straightedge. Lift the free side of the upper half-leaf, and thinly paste the corresponding part of the lower one. Let it go down again; then deal with the other side in the same way. Place the leaf between two sheets of paper, and smooth it down very firmly with a *zongshua*.

If you do not want to paste the two half-leaves together again, line them as described above with a single sheet of thin paper. When they are dry, bind them up as a double-leaved book.

Only leaves or single-sheet items that are not too decayed can be split. You should be careful not to use this method on very old and decayed paper, as when the leaf has been split and the paste is being rinsed off, it is easy to wash the paper away, and it will then be beyond repair.

QUICK REPAIRS TO TORN LEAVES

Torn leaves should be repaired without delay so that they do not fall out and get lost. If there are only small tears in a few places and the damage is not extensive, this can be done without taking the book apart. Lay the fascicle on the bench, place a sheet of paper under the damaged leaf, and fit the torn edges together. Lightly hold them down with the thumb and index finger of the left hand so that they do not move. Holding the brush in the right hand, apply some thin paste to the back of the leaf in a strip one centimeter wide along the torn edges. Stick a strip of *mianzhi* one centimeter wide along the tear, thinly paste the top of this strip, then stick the back of the other half of the leaf onto it. Cover the leaf with a sheet of waste paper, and smooth it down all along the line of the repair with the right hand. Place sheets of paper either side of the repaired leaf, and make sure that the fold at the *shukou* is firmly pressed and in the right position. Then lay a wooden board over the fascicle, and when the repair has dried, trim off the ends of the paper strip flush with the edges of the book. Such emergency repairs will obviously have to be reversed and done properly when the book is next taken apart.

THE THREAD BINDING

Taken in its broadest sense, the term "old books" includes all written records produced in China during the last three thousand years, since the invention of the script. These records are bound in different ways according to the period, and each has its own characteristics. When we repair and bind damaged books, we should preserve their original characteristics and not arbitrarily change and destroy them. Therefore in introducing the techniques of binding, we point out that they must be applied according to the circumstances. But from the butterfly binding of the Song and Yuan, the wrapped-back binding of the Ming, to the thread binding, which is still in use today, the basic techniques have much in common and are very similar. We therefore take the ordinary thread binding as an example to introduce binding method and procedure.

Basic Binding Techniques

FOLDING THE LEAVES

When the loose leaves of the book have been repaired and the *shukou* joined, the leaves must be folded before the book can be bound. Place the leaf text down on the bench, with the head margin on the left and the tail margin on the right. Fold the half-leaf back with both hands. Make sure that the *shukou* is straight. The crease should be exactly in the center of the fishtail, running along the center line of the *banxin*. It should not slope to the left or right, but if any leaves were folded to one side from the start, they should be left as they are, because if you try to change the fold, the old fold will reassert itself. Fold the leaf along the line of the original crease, and press it flat up and down the *shukou* with both hands.

If the *shukou* has been repaired, brush over the repair with your hand before you fold the leaf to remove any scraps of paper or grit that may have stuck to the paper strip. Unless you do this, they will get pressed into the leaf and damage it when you beat the book down.

If the leaf is very old, when you fold it the *shukou* could easily split. In such cases, while the leaf is still damp, fold it without waiting for it to dry out completely. In this way, the *shukou* will not be so brittle that it breaks and splits open.

After folding each leaf, place it deftly onto a pressing board on the right. When the whole fascicle has been folded, check the number of leaves and see that none is upside down or in the wrong order; then taking a few leaves at a time, trim off any fibers or bits of paper sticking out around the edges, and pile them up in order on the pressing board.

When folding, you must wash your hands frequently so as not to dirty the leaves. In the case of books printed with inferior ink, or that have red text frames, the pigment easily smudges, and you should be especially careful when folding the leaves. Place a sheet of white paper over the *shukou* before you smooth it down, to avoid soiling the leaves.

INTERLEAVING

• *Purpose*

A leaf that has been repaired or had its *shukou* joined is sometimes bumpy and uneven on the surface, and can only be beaten down if a sheet of plain interleaving paper is placed inside the fold. Or sometimes, when a very thin leaf is folded, the text on one side shows through on the other, affecting its legibility. So some books need to be interleaved when they are bound. The best papers to use are *luowenzhi* and *mianlianzhi*, because of their softness and flexibility. Hard, machine-made papers should under no circumstances be used, as they will cause the *shukou* to burst open.

• *Method*

Prepare as many sheets of interleaving paper as there are leaves, and cut them a little larger than the size of the leaves. Then divide them into piles of thirty or forty sheets, slide your hand over them to separate them,

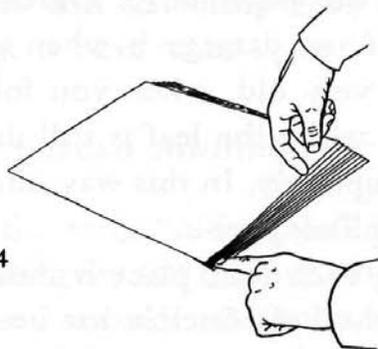


FIGURE 4

and spray them with warm water. When they have all been sprayed, place them between sheets of thick paper, and press them down with a wooden board to make them lie flat. When they have dried a little, straighten them up, and fold ten or so in half. Alternatively, you can fold the interleaving sheets in half before you spray and flatten them. Then hold the bottom sheet down lightly at the bottom left edge with the left hand, and fan the pile out by deftly passing the back of the right index finger over the folded edges until the pile is staggered sheet by sheet (figure 4). Then hold the pile in the left hand and draw the leaves out one by one with the right hand and put them on the right-hand side of the bench.

When you have finished, straighten them up a little and put them back on the right-hand side of the bench. Put the leaves that are to be interleaved on the left, and take a batch of ten or so and put them straight in front of you. Open the leaves with the left hand, and insert the interleaving sheets with the right, working from either bottom to top or top to bottom of the pile.

Normally, the interleaving paper is folded exactly in half and the folded edge is inserted as close as possible to the *shukou* of the leaf (figure 5), but occasionally the repairs to the *shukou* are so thick that even after interleaving, the *shukou* is difficult to beat down. In this case, fold the interleaving paper a few millimeters short, and with the folded edge to the *shunao* of the book, insert the two free edges into the *shukou* (figure 6); then it will be easy to beat down. When you have interleaved the first batch, take it in both hands with the *shukou* downward, and level it up on the bench. Then put it on a pressing board placed across the top of the bench directly in front of you, and proceed to the next batch.

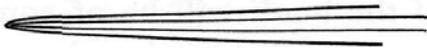


FIGURE 5



FIGURE 6

• Interleaving with Single Sheets

To save the bother of folding, you can also interleave with two single sheets of paper of the same quality as that used for the above method. Ordinary books that are not particularly difficult to beat down can be interleaved with one single sheet, which not only saves the bother of



FIGURE 7

folding, but also economizes on paper. If the *shukou* of a book that has been interleaved with single sheets cannot be beaten down, push some of the interleaving sheets right up to the *shukou* of the leaves, but leave some of them one or two millimeters short of the *shukou* (figure 7); then

stick these lightly to the leaf with a few dabs of paste in the *shunao*, so that they do not move when you level up the *shukou*. In this way, you can prevent the *shukou* from being thicker than the rest of the book.

When a book has been interleaved, it occasionally happens that the head and tail margins are not the same thickness. When the difference in thickness is great, we describe the book colloquially as "coffin shaped," the Chinese coffin being wedge shaped, with the deeper part at the head. The cause of this is that with handmade paper, the two edges are sometimes of different thickness. At the time of printing, the sheets should be turned around to even them up, but occasionally the printers forget to do this. The problem also arises when insufficient attention is paid to the paper when repairing and lining, so that the head or tail is repaired too thickly.

The problem is easily solved by inserting an extra half-sheet of interleaving into the thinner side of the book every one to four leaves, as necessary, to bring it up to the same level as the other side. When interleaving, you should be careful to insert the sheets first one way and then the other, so that the head and tail of the book will be of equal thickness.

EXTENDING THE SHUNAO

• *The Two Methods*

If the *shunao* is too narrow, when the book has been stitched it will be difficult to read, and at worst it might actually be impossible to stitch it. Some books are also disproportionately tall, presenting an ugly appearance. To give the book suitable width, the *shunao* must be extended. There are two methods, one for interleaved books, and the other for noninterleaved books.

If the *shunao* is to be extended, the original holes pierced in it must be repaired with matching paper, or they will be visible outside the stitching in a most ugly way. The corners must also be wrapped to strengthen the *shunao* edge of the book and improve its appearance, so that from the outside there is no evidence of the extension. But if the interleaving paper is exactly the same color as the leaves, the corners need not be wrapped.

• *Extending Interleaved Books*

In this case the interleaving paper should be cut so that it sticks out from the *shunao*. If the *shunao* is to be extended by one centimeter, the interleaving paper should be wider than the *shunao* by two centimeters. Make a pile of thirty or forty interleaved leaves with the *shukou* facing away from you, place a board over the *shukou*, and weight it down with a stone so that the pile does not move. Take the *shunao* of the leaves together with the interleaving and turn them back over the board. Let one half-leaf come down, and one half-sheet of interleaving. Slide a sheet of colored paper under the leaf so that you can easily see its edge through the interleaving; then fold the interleaving back level with the edge of the leaf. Bring down the other half of the interleaving and the other half of the leaf, and move the sheet of colored paper on top of them. Then bring down the next half-leaf and its half-sheet of interleaving, and fold the interleaving in (figure 8). Continue in this way until you have finished the pile; then turn the whole pile over and deal with the other half-leaves in the same way (figure 9). Then feel with your



FIGURE 8

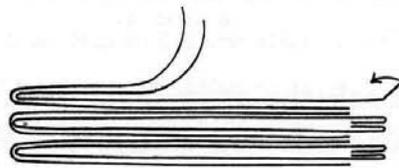
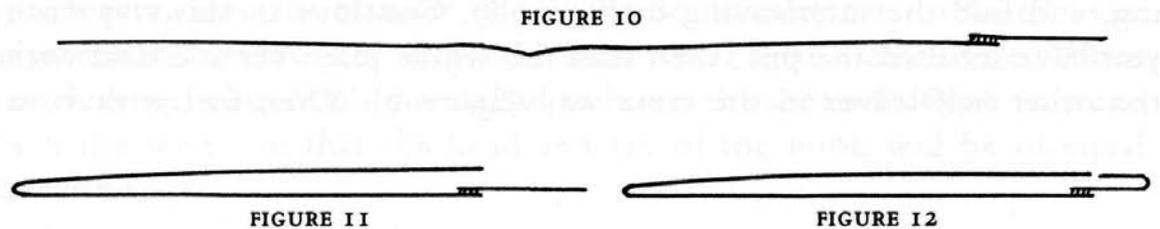


FIGURE 9

hand to see whether the extended *shunao* is the same thickness as the book. If the folded paper at the *shunao* is thicker than the book, open out one of the folds every few leaves to bring the *shunao* down to exactly the same thickness. If the book is thicker, stick strips of paper onto the folds at the *shunao* with a few spots of paste to bring the *shunao* up to the same thickness. If the book has been interleaved with single sheets, to bring the *shunao* up to the same thickness as the book, it will probably be necessary to paste some strips of paper on all the folded interleaving, depending on its thickness. Alternatively, you could cut the interleaving paper wider than usual, and fold it in twice: first fold a third of it and then the rest so that it is level with the edge of the leaf.

• *Extending Noninterleaved Books*

Lay the unfolded leaves text down on the pasteboard in batches of ten or so. Stagger them so as to expose about three millimeters of the side margin, and cover the top one with a sheet of paper; then apply paste thinly to the exposed margins. Prepare some strips of paper the same length as the height of the leaves and of a matching color. If the *shunao* is to be extended by one centimeter, the strips should be two centimeters wide so that they can be folded back. Stick one strip to the edge of each leaf (figure 10), and when you have finished the batch, lay a sheet of paper over it and smooth it down with your hands. Separate the leaves one by one and place them on another pasteboard; proceed to the next batch and deal with it in the same way. When the paste has dried, fold the leaves (figure 11), and continue as for extending interleaved books:



fold back the strip level with the free edge of the leaf, that is, the one that has not had a strip pasted to it (figure 12). A point to note when pasting these strips on is that only one side must be pasted. If any paste gets on the side that is to be folded back, it will be difficult to beat down.

BEATING DOWN

The principal reason for beating down is to thin those parts of the leaf that have been repaired. During the course of repair, an extra layer of paper will have been added, and when all the leaves are gathered together to form a fascicle the repaired paper will look too thick. It must therefore be beaten down to restore the book to its original thickness.

• *Method*

Place the folded leaves on the stone in batches of ten or so, aligned by the *shukou* and tail margin. Hold the *shukou* down lightly with the left

hand so that the leaves do not move. Take the flat-headed hammer in the right hand, and lightly beat the places where the holes or the *shukou* have been repaired. Feel the leaves with the left hand during the course of the beating to find the high places so that they can be beaten down. When one side of the leaves has been beaten, turn them over and do the other.

For leaves that have been interleaved or are of thick or soft paper, one beating is normally sufficient. But if you encounter paper that is rather hard or leaves that have been much repaired, you must not be in a hurry to beat them down, nor must you beat them too violently. If one beating is insufficient, roll the leaves a little, weight them down lightly with a stone for a day or two, and then beat them again.

• *Points to Note*

Before beating down, be sure to wait until the repairs are completely dry, or the leaves could easily stick together. Do not try to beat down too many leaves at a time, and do not beat them too violently, or you may damage them. If they have to be repaired again, they will be even harder to beat down.

The face of the hammer that strikes the leaves must be absolutely flat. If not, it may damage them or produce a black circle like a fish eye around the repaired holes.

Leaves that have been interleaved must be properly aligned before you beat them down, because if the repaired areas are not beaten down together, they will look uneven after they are aligned.

ALIGNING THE TEXT FRAMES

The main purpose of aligning is to even up the *shukou* and make the book pleasing to the eye. You should therefore try to align all the leaves to the tail border of the text frame to give the *shukou* a regular appearance. Before aligning attend to the following two matters.

• *Retaining Seals and Annotations*

First examine every chapter of the book to see whether there are any collectors' seals outside the border of the text frame. Then see if there are any annotations in the head or tail margins that might be at risk of

being cut off when the book is trimmed. If there are any in the head margin, move the leaf downward until the seal or annotation is out of danger, and if there are any in the tail margin, move the leaf upward. It is better not to align the text frames at all than to do so and damage the annotations.

• *Dividing the Book into Fascicles*

After having been beaten down, the leaves should be suitably divided into fascicles according to the chapter numbering. Under normal circumstances they should be divided as they were originally, but if they have been interleaved, they might form too thick a fascicle and have to be further divided according to chapter numbering. Generally a fascicle should consist of one chapter, but if the chapter contains fewer than fifty leaves, the fascicle may comprise two or three chapters. About ninety leaves is the right size for one fascicle, or about fifty leaves if they have been interleaved. But try to avoid dividing one chapter into two fascicles.

• *Endpapers*

After dividing the leaves into fascicles, put endpapers at the front and back of each fascicle. It is usual to put three at the front and two at the back of the fascicle, or two each at the front and back. The paper used for making the endpapers should be a little thicker than the leaves. If it is too thin, it can be lined with a sheet of *mianzhi* or interleaved with a single sheet of white paper. If the old endpapers bear valuable annotations, they should be carefully repaired and preserved (see "Repairing the Covers and Endpapers," below), and additional new endpapers may be supplied to protect them. There are two ways of aligning the leaves, as follows.

• *Method 1*

Thick fascicles should be aligned one at a time, but if they are thin, two can be taken at a time. Start with the last fascicle so that you can easily see whether the text frames are vertically aligned. Take the fascicle in both hands and even up the *shukou* against the awl board. Then place the book flat on the awl board, and hold the head margin down with the middle

and index fingers of the left hand, with the thumb against the *shukou*. With the middle and index fingers of the right hand underneath, and the thumb on top, take the leaves by the tail margin, working from top to bottom, and draw them out, so that the tail borders of the text frames form a vertical line down the *shukou*. If the borders of the text frames are not of equal thickness, align them to the outside edge of the border. If the text frame does not extend across the *shukou*, align the leaves to the fishtail.

After aligning each fascicle, hold it near the *shukou* with the left hand at the head margin and the right hand at the tail, and even up the *shukou* against the awl board. Then lay it on a pressing board in front of you. If you find that any leaves are not aligned, take one edge of the leaf with the hand and straighten it up, or edge it out with a bone hairpin, placing a board on top of the fascicle to stop it from getting out of line again. Then align the next fascicle in the same way, and lay it on top of the first one. When you have aligned them all, take the whole book between two pressing boards with the hands at the center of each board, and even it up against the bench. The aligning is thus complete. This is the method generally used when old books are being repaired.

• Method 2

This method is used if the book is rather large or the paper rough, so that the leaves are difficult to draw out. First knock two large pins vertically into the awl board, opposite the head and tail margins of the book. Place the leaves to be aligned to one side of the awl board, and beginning with the last leaf of each fascicle, lay them one by one on the awl board with the *shukou* against the pins, one on top of the other, in order, ending with the first leaf of the fascicle. As the leaves are being laid down the *shukou* is brought right up against the pins, and the tail borders of the text frame are aligned using the right-hand pin as a guide.

PRESSING

When a book has been repaired, and especially if it has been interleaved, the leaves relax and swell, and have to be firmly pressed to flatten and consolidate them.

• *Method*

When the leaves have been properly aligned, take the book between pressing boards and place it in the press. Gradually tighten the press, making sure the book does not move. Do not tighten it all at once, and keep checking the two sides with a ruler to make sure they are going down evenly, and that the fascicles are not pressed slanting. Having rectified any discrepancy, tighten it again. Leave the book in the press for a couple of days, until it is flat and consolidated.

• *The Traditional Method*

If the facilities at your disposal are simple and you have no press, you can use a stone or some other heavy object instead. The result will be the same, but you must press rather longer, for three to five days.

• *Points to Note*

If the leaves have been much repaired and are rather thick, so that they cannot be flattened by beating down, you should not try to flatten them with the press. Press them gently over a long period with a stone or other heavy object. If you try to flatten uneven leaves by applying great pressure with a press, you will make the unevenness worse and produce indentations. Therefore any leaves that cannot be flattened by beating down should be pressed with a stone or other heavy object.

Take great care never to press leaves that have been printed with the *gonghua* technique of embossing. Examples of this are found in the *Luoxuan biangu jianpu* (Wisteria Studio Collection of Letter Papers) and the *Shizhuzhai jianpu* (Ten Bamboo Studio Collection of Letter Papers) printed by Hu Yuecong in the Chongzhen period (1628–1644). In these works, the illustrations stand out from the page in relief, so that if they were put in the press they would be flattened and the whole book ruined. You cannot be too careful about this.

INSERTING PAPER TWISTS

• *Making the Twists and Their Use*

Paper twists are inserted to fasten the loose leaves together so that they are easy to bind into a fascicle. They are made of *mianzhi*, and there are

two kinds. One is made from a strip of *mianzhi* ten centimeters long and four centimeters wide; both ends are cut into points and the strip is rolled into a paper twist, pointed at both ends. The other is rolled in line with the vertical lines of the mold pattern into a twist pointed at one end.

Double-pointed twists are used for thick books and books that have been interleaved or had their *shunao* extended, and single-pointed twists are used for ordinary books and thin fascicles.

• *Procedure*

First place an awl board on the bench with a pasteboard underneath it to deaden the sound. Then lay a sheet of thick paper, bigger than the book, on the awl board. Take the book out of the press with the last fascicle on top and the first fascicle at the bottom, and put it to the left of the awl board. Then place a fascicle on the awl board, and if any leaves have moved, straighten them up again. Then lay one of the old covers on top of the fascicle as a guide to where the holes should be pierced. Place a straightedge along the *shukou* to hold the fascicle down, and pierce the holes in the *shunao* in the appropriate position. If double-pointed twists are to be used, double holes are pierced, two near the head and two near the tail. In the case of books that have had their *shunao* extended, one of the two should be pierced in the leaves, and the other in the extended interleaving; the double-pointed twist is used to fasten them together.

To pierce the holes, first prick out where they should go on an old cover, then lay the cover on top of the fascicle and use it as a guide. Hold the awl in the left hand between the thumb and all four fingers, and rest the wrist on the straightedge. Keep it quite vertical, or the holes will be slanting. Take the mallet in the right hand and strike the awl. Thin fascicles can be pierced with one blow, but thick fascicles will require two. When the hole has been pierced through, screw the awl in with the right hand. (Before you start, rub a little paraffin wax onto the point to lubricate it; it will then go in more easily.) Then turn the fascicle by turning the sheet of paper underneath it, so that the *shunao* edge overhangs the edge of the awl board, thus making the holes accessible. Insert the paper twists through the holes, and make sure that they are tightly in place. Then remove the straightedge, and turn the fascicle over. If the *shunao* has been extended and double-pointed paper twists used, the two

ends should be tied together and the knot beaten flat with a few blows of the hammer. The ends of single-pointed twists may be either stuck down with thick paste, or trimmed off to within a few millimeters and simply curled over; either way, they should then be beaten flat. Then use the old cover as a template for the next fascicle, and proceed in the same way.

TRIMMING

All books that have been interleaved or repaired should be trimmed to make the edges clean and even, to facilitate the fitting of corner protectors and covers, and to improve the appearance of the book. I am aware that most modern conservators would avoid trimming anything off the original under any circumstances, but in the case of Chinese books, if corner protectors are to be fitted, trimming is unfortunately necessary.

After the paper twists have been inserted, use a setsquare and an awl or pencil to mark the parts of the head, tail, and *shunao* edges that are to be trimmed off. Then proceed to the trimming, which may be done either by hand or with an electric guillotine. Each of these two ways of trimming has its advantages and disadvantages. In the case of old books with brittle paper, or books with notes in the margins, which should not be cut too close, it is safer to do the trimming by hand, one fascicle at a time. The disadvantage of trimming by hand is that the cut is not usually so clean, the blade leaving marks on the edge of the book, which must then be sanded off. The guillotine, however, makes a cut that is always perfectly straight and leaves the edges very smooth, saving much effort. But one mistake when using the guillotine could destroy the entire book.

• *Trimming by Hand*

Place the book that is to be trimmed on a wooden trimming board, four to six fascicles at a time. Trim the book as follows, starting with the *shunao* edge. Align the book by the *shukou* and lay a wooden board, ten centimeters wide and two centimeters thick, and a little longer than the book, over it, along the line where the cut is to be made. Place your left foot on the board, and hold the handle of the broad-bladed knife with your right hand and the back edge of the blade with your left. The blade

should be brought closely against the side of the wooden board, exactly over the line you have marked out. Make a straight cut, using the full weight of your arms. Make quite sure that the blade does not incline inward, or the bottom fascicles will be trimmed too close. Then, with the *shukou* facing toward you, align the fascicles by the tail edge of the text frames, so that you have a vertical black line running from the top to the bottom of the book. Then trim the tail edge of the book, and finally the head edge. If there is only one fascicle to trim, or if the book is to be trimmed one fascicle at a time, place it on a wooden board on the bench, and trim it with a sharp knife and a straightedge in the same order as above, starting with the *shunao* edge and then trimming the tail and finally the head edges.

• *Trimming with the Guillotine*

First wipe the base of the guillotine clean; then position the book on it according to the line you have drawn on the top fascicle. Hold it firmly in place, and make the cut. You can normally cut seven or eight fascicles at a time, but this depends on the thickness of the fascicles and the size of the guillotine. As with trimming by hand, first trim the *shunao* edge, then the tail edge, and finally the head edge.

• *Points to Note*

Before you trim the book, look carefully to see if there are any annotations in the head and tail margins, and whether there is any possibility that they might be trimmed off. If there are any annotations, you should be particularly careful not to trim too close, and even if there are no annotations, you should still trim as little as possible. Because the proportions of the head and tail margins are one of the factors that determine the quality of the book, you should be careful not to destroy them by overtrimming. If there are occasionally leaves with annotations at the extreme head or tail (and these should have been moved aside when the leaves were being aligned, as described above), make cuts either side of the annotation with a pair of scissors, and fold that section down to prevent the text from being damaged or even trimmed off completely. If there are a great many annotations, it is better to leave the book untrimmed and the leaves uneven than to risk trimming them off.

If the paper is very old, it is essential to use a sharp knife, and to place a sheet of rough strawboard on top of the pile before making the cut. Do the trimming by hand, and only trim one fascicle at a time to ensure that the book is cut perfectly straight.

SANDING

After the book has been trimmed, the marks left by the blade may need to be rubbed smooth with sandpaper. Place the book between pressing boards, weighted down with a stone or some other heavy object, on the edge of the bench. Hold the book down firmly with the left hand; then carefully rub the *shunao*, tail, and head edges with sandpaper until all the blade marks have disappeared. The strokes should be light and even. If you rub too hard, the edges will become greasy and dirty. This is especially likely to happen with books printed on *zhuzhi*, producing a most unpleasant black sheen that greatly detracts from the quality of the repair. Do not try to rub down too many fascicles at a time; they should be done in batches of no more than twenty.

To enhance the appearance of books printed on fine white paper, it used to be the practice to polish the edges with cuttlefish bone after they had been sanded, but this has been discontinued as cuttlefish attracts insects.

FITTING CORNER PROTECTORS

The use of thin, tough silk to protect the corners of the book at the *shunao* has a long history. On the one hand it serves to prevent the head and tail corners of the book from becoming dog-eared; on the other, it enhances the appearance of the book. This is especially so in the case of books that have had their *shunao* extended: corner protectors conceal the division between the leaves and the extension, giving the book a much finer and more regular appearance. But the use of corner protectors has one drawback: because it involves the use of paste, it makes the book susceptible to attack by insects and rodents. In humid storage conditions, you should consider carefully whether or not corner protectors ought to be fitted.

• *Size*

Size is determined by the width of the *shunao*. In most cases, the length of the corner will be one and a half times the width. If the book is rather tall, it can be a little longer, or if wide, a little shorter; but the width of the corner should never exceed its length.

• *Procedure*

First prepare some thin, tough silk that has been lined with paper (for how to do this, see below). The color should harmonize with that of the book. For example, you could use old-looking cream silk for books printed on *zhuzhi*, or silk either bleached white or dyed light green for books printed on white paper.

First work out the size of the corner protector with a piece of paper; then cut the silk to this pattern. Then cut a strip of fairly thick paper to the same width as the corner (i.e., as wide as the distance from the *shunao* edge to the stitching), and paste it onto the bench. Take a fascicle, the right way up, and position it over the strip of paper so that the *shunao* edge of the fascicle is aligned with the right-hand edge of the strip (figure 13). The strip should protrude below the tail edge of the fascicle.

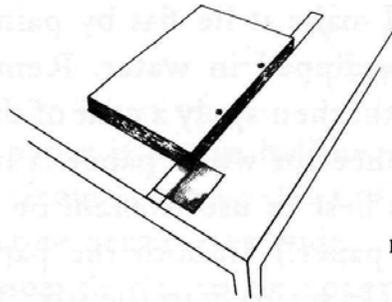


FIGURE 13

Place the piece of silk, cut exactly to size, face downward on the bench. Apply a coat of thick paste to the back of the silk with the middle finger of the right hand. Spread the paste evenly; then pick up the piece of silk with the pasted tip of the middle finger. Place the four fingers of the left hand against the tail *shunao* edge of the fascicle, and raise everything up except the two leaves of the lower endpaper, which are left flat on the bench. Then insert the pasted piece of silk, which you are holding with the middle finger of the right hand, between the leaves and the endpaper.

Align it with the left-hand side of the paper strip. Then let the fascicle down onto it, and take a small flat-headed hammer in the right hand and lightly beat it down two or three times. Then raise the two leaves of the upper endpaper, bring the silk up over the tail edge, and press it down firmly with the thumb. Apply a little thick paste to the top of the folded-over silk, so that the endpaper sticks to the leaves. Turn the fascicle, and place it with the *shunao* parallel with the edge of the bench. With the thumb of the left hand push the silk forward around the corner of the fascicle and stick it to the *shunao* edge. Raise the upper leaf of the upper endpaper, and fold the silk over so that it sticks to the lower leaf of the endpaper. Apply a little more paste and stick down the upper leaf of the endpaper. Turn the fascicle over, and stick down the remaining edge of the piece of silk in the same way. Finally, holding the fascicle with both hands by the head and tail edges, knock the *shunao* edge against the bench a few times. Then deal with the head corner of the fascicle in the same way. Use the oblong handstone to make the corners crisp.

• *Lining the Silk with Paper*

The silk that is to be used for making corner protectors should first be lined with white paper. Spread the silk out on a varnished wooden board or a lacquered lining table, and make it lie flat by painting it along its warp and weft with a *zongshua* dipped in water. Remove the surplus water with a piece of cotton cloth; then apply a coat of thick paste evenly with the *zongshua*. Then lay a sheet of white paper, a little larger in all dimensions, over the silk. (It is best to use *mianzhi* or some other thin white paper; do not use thick paper.) Smooth the paper down firmly with a dry *zongshua* so that it sticks securely to the silk. Then apply some thin paste to all four edges, and stretch it out on a wallboard. It can be used as soon as it is dry.

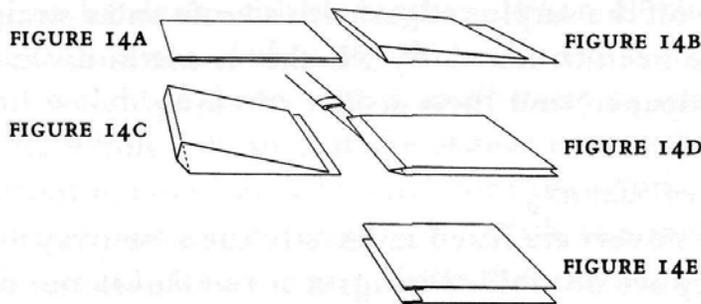
MAKING THE COVERS

The covers not only protect the leaves of the book, but also enhance its appearance. There are various ways of making them, which are used according to the circumstances.

• *The Ordinary Method*

This is a relatively simple method for ordinary books, and is economical in both labor and materials.

First cut the cover paper to size. Each sheet should be the width of two covers, with an extra margin to allow for the edges that are to be folded in. If there are a lot of covers to be made, do them in batches of three to five sheets. Fold the sheet in half with the right side outward (figure 14A). Then make a crease where the edge of the cover is to be folded in (figure 14B). The width of the folded edge depends on the size of the book, but in most cases it will be about one centimeter. Make a good crease; then turn the sheet over and crease the other edge in the same way (figure 14C). Use a smooth tool to make the creases permanent. Then slit the sheet open along the center fold with a paper knife to form two single covers (figure 14D). Fold the edges in along the creases so that each cover has a folded edge at the *shukou* (figure 14E). The creases are



made before the paper is cut in half because it is quite easy to make a perfectly straight crease in a large sheet of paper, but very difficult to fold a long strip only one centimeter wide.

Lay the book that is to be covered across the bench with the *shukou* to the front, and place a pressing board beside it. Transfer the first fascicle onto the pressing board. With the middle finger of the right hand, apply three or four spots of thick paste to the endpaper close to the *shukou*. Apply two spots to the ends of the paper twists at the *shunao*. Using both hands, take a cover between the middle and index finger. Place the thumbs against the *shukou*, and stick the cover onto the endpaper in the correct position. Press it down with both hands onto the spots of paste. Then pile the second fascicle on top of the first, and stick

the cover on in the same way. When all the upper covers have been stuck on, lay the second pressing board on top of the pile, turn the whole book over, and stick the lower covers on in the same way. When both covers are in place, trim the book exactly to size.

If a book only needs covering or the old covers need replacing, and there is no need to trim the leaves, the following method can be used.

• *Replacing Old Covers*

If a fascicle only needs to have its covers replaced, use the above method, but as soon as you have stuck down the upper cover, take the fascicle in the left hand and a pair of scissors in the right, and trim off the surplus paper flush with the edges of the book: start with the tail edge, turn the book to the *shunao* edge, and finally trim off the head edge. Then turn the book over, stick the lower cover on, and trim it with the scissors in the same way. Alternatively, you can place the fascicle on the trimming board and trim off the surplus edges with a knife and a straightedge. After the covers have been trimmed, by whichever method, smooth the edges again with sandpaper, and then do the stitching.

• *Double-Leaved Covers*

Double-leaved covers are fitted in exactly the same way as single-leaved covers, but they are not folded in again at the *shukou* nor are they tipped onto the endpapers at the *shukou*.

• *The Fully Folded Cover*

The advantage of the fully folded cover, that is, a single-leaved cover in which all four edges are folded in, is that it does not easily get dog-eared. Because this type of cover has an elegant appearance, it is often used for fine editions.

First work out how many covers can be made from a full sheet of cover paper, allowing for 1.5 centimeters to be folded in on all four edges, and cut the paper. Proceed as in the ordinary method above: make a good crease along the edge that is to be tipped onto the *shukou*, and then cut the sheets open to form single covers. Make sure all four edges are quite straight.

Place the first fascicle on the pressing board, and with the middle finger of the right hand, apply four spots of thick paste to the endpapers close to the *shukou*, so that there are five equal spaces (figure 15). Using both hands, take a cover between the middle finger and the index finger. Place your thumbs against the *shukou*, and stick the folded edge of the upper cover onto the endpaper, making sure that it overhangs the head and tail edges of the book by an equal distance. Then pile the second fascicle on top of the first, and stick the upper cover on in the same way.

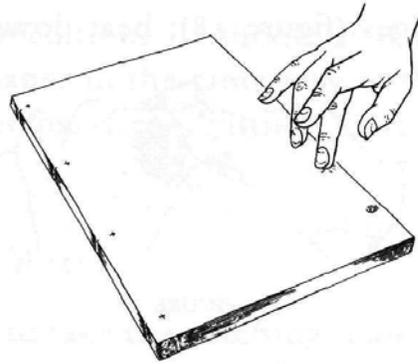


FIGURE 15

If the whole book does not consist of more than ten fascicles, all the covers can be fitted at the same time, but if there are a large number of fascicles, they will have to be dealt with in batches. When all the upper covers have been stuck on at the *shukou*, lay the second pressing board on top of the pile, and weight it down with a small stone or some other heavy object. Turn the whole pile so that the *shunao* edge is facing you; then slide the top pressing board back by one-third the width of the book, so as to expose the *shunao* edge completely. With the middle and index fingers of both hands, make a crease along the overhanging edge of the cover by pressing it against the angle at the *shunao* edge of the fascicle. Lift the cover and fold it in along the line of the crease; then stick the folded edge down in two or three places. Then slide the first fascicle back together with the pressing board, and fold in the *shunao* edge of the cover of the second fascicle in the same way.

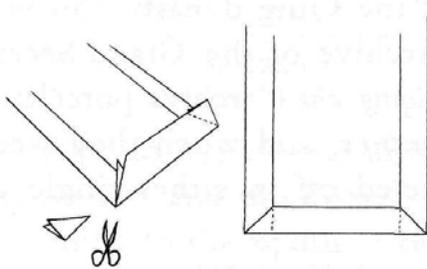


FIGURE 16

When all the *shunao* edges have been folded in, turn the book with the pressing boards and fold in the tail edges in the same way. After you have made the crease, cut off the double thickness at each of the corners obliquely with a pair of scissors to form a half-miter; then fold the tail edge in and paste it down (figure 16). If necessary, the corners can be fully mitered by opening out the *shukou*

and *shunao* edges a little and making a long cut obliquely across the corners of the cover (figure 17). If silk has been used for the cover, do not cut it or it will fray; first fold in the corners obliquely, and then the edges (figure 18); beat down the double thickness at

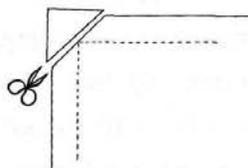


FIGURE 17



FIGURE 18

the corners with a small hammer. Then stick the tail edge to the endpaper at each end and in the middle. If corner protectors have been used, stick the cover onto them. Fold in the head edges in the same way; then deal with the lower covers.

• Materials

Ordinary covers are usually made from a sheet of thin *mianlianzhi* colored brown or blue, and lined with one or two sheets of thin, uncolored paper, preferably *xuanzhi*, but *maobianzhi* is also used. Although thicker papers can be used without lining, the normal practice is to use thin papers and line them. Line whole sheets at a time, and paste them onto a wallboard to stretch. (For how to do this, see "The Scroll," below.) When dry, they can be cut to size.

To produce brown covers, the paper is stained with ocher, which may be mixed with gamboge and darkened with Huizhou ink. This brown cover paper is known as *guse shupizhi* ("antique-colored cover paper"), and can occasionally be bought ready made.

Blue covers are made from paper colored with *huaqing*, which is known as *ciqing shupizhi* ("porcelain-blue cover paper"). This is a very tasteful paper, and can also be bought ready made. It was produced during the Qianlong and Jiaqing periods of the Qing dynasty and was originally kept in the Neige Daku (Great Archive of the Grand Secretariat), for which reason it was known as *ku ciqing zhi* ("archive porcelain-blue paper"). The sheets were all stuck together, and when they were needed, they were soaked in water and peeled off in either single or double layers to make the covers.

Various decorative papers can also be used. *Hupizhi* literally means "tiger-skin paper," but to judge from its appearance would more appro-

priately be called "leopard-skin paper." It is very thin, and needs a good lining. It is sometimes used to make covers for novels. Vermilion *lajian*, which is flecked with either fragments of gold leaf or gold dust, gives the book a most splendid appearance.

Silk is occasionally used for very fine editions. It should first be dyed a suitable color, and then lined with paper in the same way as the silk that is used for making corner protectors (see "Fitting Corner Protectors," below).

PIERCING THE BINDING HOLES

Most books have four holes pierced in them to take the stitching. Larger volumes may have five or six, and exceptionally big ones may have seven or even more, according to the circumstances.

• *Spacing the Holes*

Place the fascicle on the bench with the *shunao* toward you. Get an oblong piece of paper and fold it twice so as to form a right-angled triangle (figure 19), and use it in the following manner to mark the position of the holes. Line it up with the *shunao* and tail edges of the book; then mark the position of the corner hole by making a pinprick through the paper triangle (figure 20). In general, the distance from the

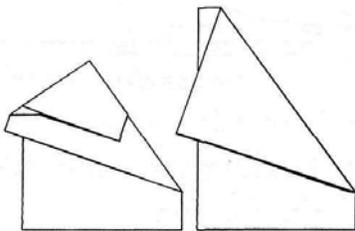


FIGURE 19

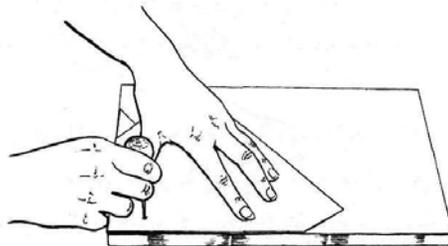


FIGURE 20

tail edge to the corner hole will be one-tenth the height of the book (figure 21), and the distance from the *shunao* edge to the hole will vary according to the width of the *shunao*. If the *shunao* is wide, so that there is a generous margin of paper between the *shunao* edge and the text border, the distance between the *shunao* edge and the hole will be two-

thirds the distance between the tail edge and the hole (figure 22), but if it is narrow, it will be only half (figure 23). Then hold down the top corner of the paper triangle with the index finger of the right hand, take the bottom edge of the triangle with the left hand, lift it over and bring

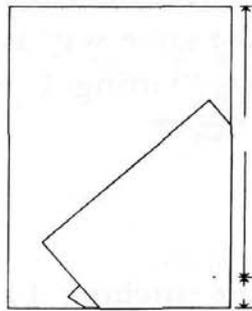


FIGURE 21



FIGURE 22

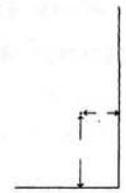


FIGURE 23

it down in line with the head edge (figure 24), and make a firm crease at the point where it has been folded over, which will be halfway between the tail and head edges. Mark the position of the head corner hole through the pinprick in the paper triangle that was made when marking the position of the tail corner hole (figure 25). In this way, its

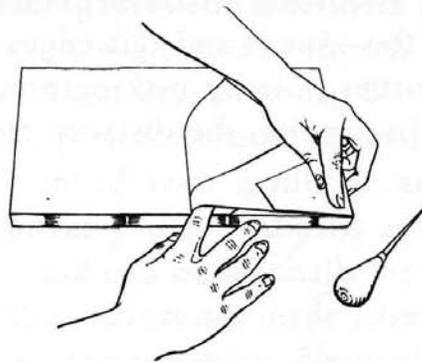


FIGURE 24

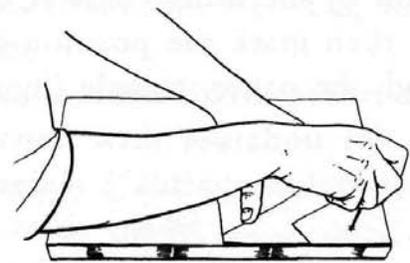


FIGURE 25

distance from the head and *shunao* edges of the book will be identical. Then turn the paper triangle over so that it is the right way up again, fold up the bottom edge in line with the crease made when marking the position of the head corner hole, and make a pinprick through the same hole (figure 26), so that when the triangle is opened out again there will

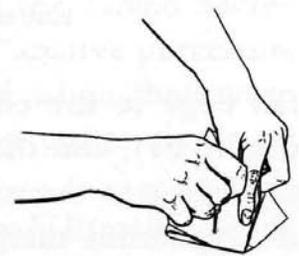


FIGURE 26

be two pinpricks in it. Line it up with the tail corner and use the second pinprick to mark the position of the lower of the two middle holes (figure 27); then line it up with the head corner and mark the position of the upper middle hole (figure 28).

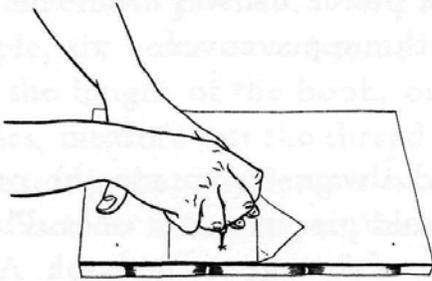


FIGURE 27

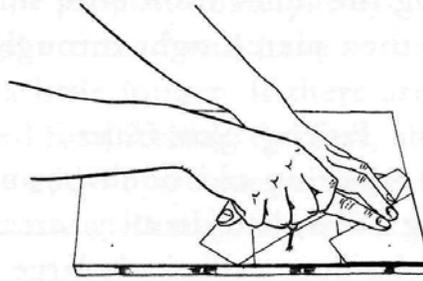


FIGURE 28

Although this procedure seems rather complicated, it is in fact quite simple, and has several advantages. Once the position of the first hole has been determined, no further measurements are needed; and once the positions of the holes in the first fascicle have been marked out, the same paper triangle can be used to mark out all the remaining fascicles quickly and completely accurately. Furthermore, if the distance of the first hole from the tail edge is exactly one-tenth the height of the book, the distances between the four holes will be in the ratio three to two to three (figure 29), which is generally ideal.

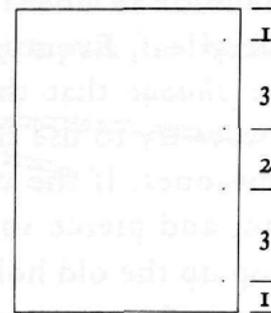


FIGURE 29

Sometimes, the four holes are equally spaced. If the book is rather long, five holes are pierced; and in the case of very large books, two holes are pierced in each corner. If the fascicles are very thick, the slightest error will cause the holes to be pierced slanting, so the paper triangle is also used to mark out the position of the holes on the lower cover of the book, and the holes are then pierced from both sides. If corner protectors have been fitted, the corner holes should be pierced exactly in line with them, so that the stitching will conceal their edges (figure 30).

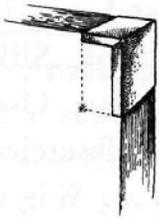


FIGURE 30

- *Piercing the Holes*

To pierce the holes, place the fascicle on an awl board with the *shunao* toward you. Hold the awl in the left hand, with the thumb in front and the four fingers behind; then take the mallet in the right hand and strike the awl. Most fascicles can be pierced through with one blow. If you are piercing the holes from both sides, first pierce halfway from the lower cover; then pierce right through from the upper cover.

- *Avoid Piercing New Holes*

When repairing old books, you should always try to use the original binding holes, and do all you can to avoid piercing new ones. Piercing new holes does a relatively large amount of damage to the book. Assuming that each fascicle needs four holes for the stitching and another four for the paper twists, a single rebinding will result in another sixteen holes in every leaf (i.e., eight in each half) if new holes are pierced. By the time the book reaches its next rebinding, there would be forty-eight holes in every leaf. Eventually, there would be so little undamaged paper left in the *shunao* that the book would be impossible to bind. So you must always try to use the original holes, and do all you can to avoid piercing new ones. If the old holes are not in line, use as many of them as you can, and pierce some new ones. Unless the book has been interleaved, stop up the old holes that you are not going to use with paper twists, and pierce the new ones to one side of them.

STITCHING

- *Selecting the Thread*

You should consider not only the strength and durability of the thread used for the stitching, but also its texture, and whether or not its color accords with that of the book. Silk or cotton thread may be used, and it may be either thick or thin, depending on the nature of the book. Silk is best for fine editions, but for ordinary books use cotton thread. Use thick thread for thick books, and fine thread for thin ones. For fascicles that are very big, but thin, you could use fine three-ply thread. When stitching, always make sure that the two threads are parallel.

• *Measuring the Thread*

Before stitching, place the book right side up on the bench with the *shunao* toward you, and measure out the thread according to the length and thickness of the book. Usually, a length of thread six times the height of the book will be sufficient for stitching one fascicle. If more than four holes have been pierced, it will have to be proportionately longer. If, for example, six holes have been pierced, the thread will have to be seven times the length of the book, or even a little longer. If there are many fascicles, measure out the thread required for stitching the first, and after determining that the length is correct, add or subtract a little for the other fascicles according to their thickness, so that no thread is wasted.

• *Threading the Needle*

The thread can usually be passed directly through the eye of the needle. If it is too thick, first thread the needle with fine thread, and knot it to make a loop; use this loop to draw the thicker thread that is used for the stitching (figure 31). Although this is easier than trying to pass the thicker



FIGURE 31

thread straight through the eye of the needle, take care to ensure that the loop of thin thread does not break when you are doing the stitching. Pull the thread through the eye of the needle so that each end of the thread is the same length, and use it double.

• *Sewing*

Hold the needle in the right hand, and the end of the thread between the teeth. Hold the *shunao* of the fascicle down with the left hand, and start by passing the thread down through the second hole from the right (i.e., the second hole from the head edge), from the front of the book to the back (figure 32). Pull the thread through until the end is drawn close to the hole; insert the needle into the *shunao*, and pick out the thread. Make a knot in the end (figure 33), and draw it into the *shunao* so that it is

FIGURE 32

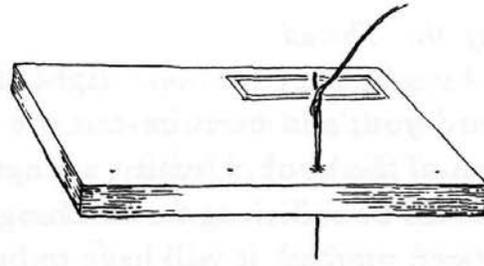


FIGURE 33

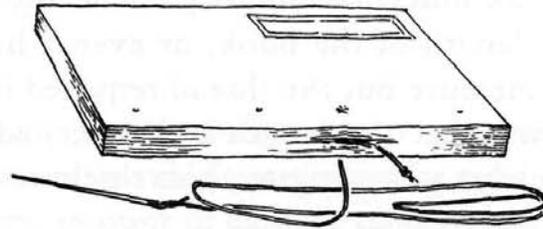
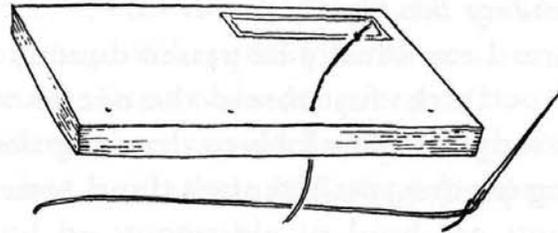


FIGURE 34



buried. Alternatively, you can tie the knot before you begin to sew, then draw it tightly through the upper cover into the hole in the *shunao* (figure 34), but this is less satisfactory. Stitch around the *shunao* edge of the fascicle, passing the thread through the same hole again, turn the fascicle over, and proceed to the lower of the two middle holes. Stitch around the *shunao* edge; then proceed to the tail corner hole. Stitch around the *shunao* edge and then the tail edge; then work your way up the head of the fascicle, and finally back to where you started (figure 35). When you stitch, the fascicle should

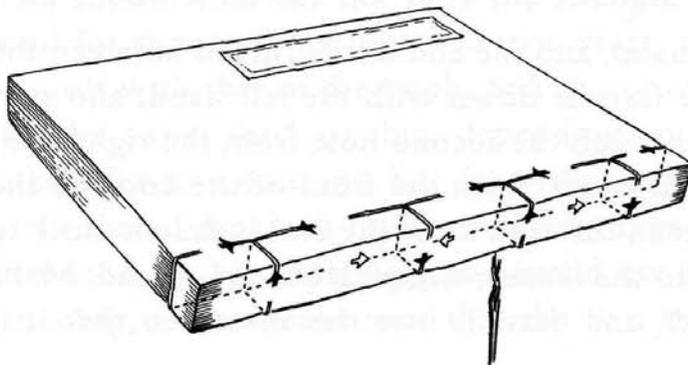


FIGURE 35

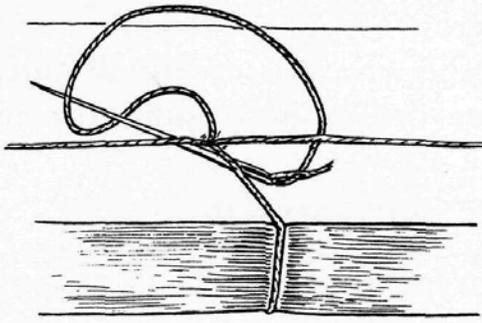


FIGURE 36

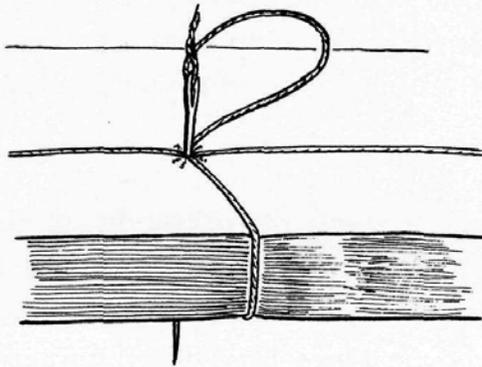


FIGURE 37

always be flat on the bench with the *shunao* edge toward you, and the needle is always passed through the fascicle downward, so that the fascicle needs to be turned over at each pass of the needle. To finish off, insert the needle under the stitching, and make a knot as close as possible to the hole (figure 36). Pass the needle back through the hole, and draw the knot into the *shunao* (figure 37). Cut off the thread as close as possible to the fascicle, and poke the ends into the *shunao* with the eye of the needle or an awl.

Make sure that the two threads in the stitching do not cross over each other. As you stitch, straighten them out with the needle so that they lie side by side. This is easily done if you hold the threads taut and insert the tip of the needle between them at the point where they come out of the binding hole and then run the needle between them along to the next binding hole, thus keeping the two threads separate. Books with six holes are stitched in exactly the same way, the only difference being that there is an extra hole in each corner.

Whenever you come across a book with broken stitching, you should repair it immediately; otherwise the covers will quickly become detached and lost, and the leaves will begin to suffer damage.

PASTING THE LABELS ON

The original labels should be carefully removed from the old covers, repaired, and pasted onto the new covers. If they are damaged or incomplete, or if the composition of the book has been changed during the course of the repair so that the number of chapters contained in each fascicle no longer corresponds with what appears on the labels, they should be pasted onto the front endpapers, and thus preserved for future reference.

The labels should be pasted to the head *shukou* corner of the covers, a quarter of a centimeter away from the head edge and the *shukou*. Use thin paste, and apply it to the four edges of the label. When the labels have been pasted on, lay sheets of white paper over them, pile the book up, and lay a pressing board over it weighted down with a stone. Allow the labels to dry for a couple of days before removing the stone and the pressing board.

INSCRIBING THE TAIL EDGE

Inscribing the tail edge of the book has a very early origin. In Peking Library there are Song editions of the literary anthology *Wenyuan yinghua* and the encyclopedia *Cefu yuangui*, both with inscriptions on the tail edge that are not of recent date. Also, the great majority of the books in the Ming-dynasty Tianyige library have their tail edges inscribed, and it is possible to tell when the book entered the library from the style of the calligraphy. In modern times multivolumed works such as the *Sibu congkan*, published by Shangwu yinshuguan, and the *Guben xiqu congkan*, published by Zhonghua shuju, have had inscriptions printed on their tail edges. This inscription serves as a kind of index, enabling the required fascicle to be conveniently located, which is especially useful in the case of multivolumed *congshu*.

First arrange the fascicles in the correct order, making a detailed

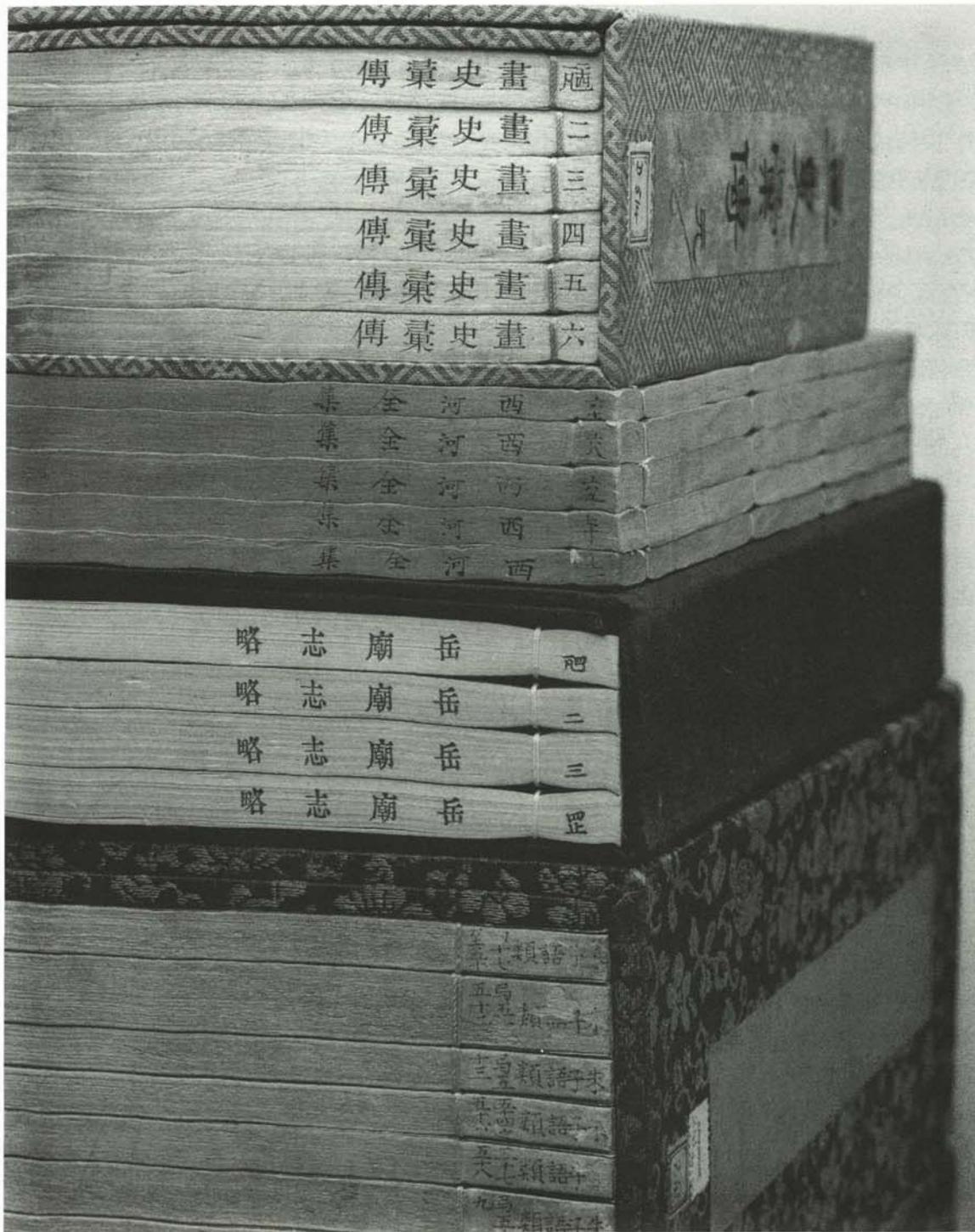


PLATE 14. Tail-edge inscriptions. Books with tail-edge title inscriptions should always be stored flat to avoid abrasion. Note how the number of each fascicle is written in the corner, between the stitching and the *shunao* edge. In the case of the work at the bottom of the pile, title and chapter number appear in this position, having been written on the silk corner protectors, which are now seriously damaged. Bodleian Library, Backhouse 514, Backhouse 627, Sinica 3061, Backhouse 241.

note on a piece of paper of the title and the number of the chapters contained in each fascicle. If the book does not consist of more than twenty fascicles, they can all be inscribed in a single operation. Bind the book tightly between pressing boards with string, and place it on a stool to the left of the bench, so that the tail edge of the book is level with the surface of the bench; you will then be able to write the inscription easily by resting the right hand, holding the brush, on the bench. Before writing, gently wipe the tail edge of the book with a towel moistened in warm water, so that the trimmed, smooth polished edges will absorb the ink more easily. Get some lengths of fine thread, and tie something heavy at each end, such as copper coins with holes in the middle, or washers. Lay these threads over the tail edge of the book, appropriately spaced, as a guide for writing the characters. The calligraphy is usually done in the Song style, with the title of the book written a little larger than the chapter numbers. The number of each fascicle is written in the *shunao* corner, inside the stitching. (See plate 14.)

CONSTRUCTING THE TAO

In the text of Xiao Zhentang's manual, repair of the *tao* receives only passing mention (see "Restoring the *Tao*," below), and no directions are given for the construction of new ones. This is unfortunate, as the detachable protective case is not only an indispensable component of the Chinese book, but is also usually the first to sustain damage, so that the construction of new *tao*, or if possible the repair of the original ones, is among the most common operations that the conservator will be called on to perform. There is, however, a published account of *tao* construction in chapter eight of Kojiro Ikegami's *Japanese Bookbinding* (adapted by Barbara B. Stephan, New York and Tokyo: Weatherhill, 1986), which the conservator should interpret in the light of his or her own experience and close study of authentic Chinese examples. To this account may be added the following notes.

Use a light, soft pasteboard or strawboard, which should be beveled at the folding edges. In general, modern machine-made boards are much too heavy and hard. Cover the boards with a good blue cotton cloth, and line them with a slightly rough surfaced paper. The lining

paper is sometimes dyed yellow (as in plate 4), perhaps with one of the many herbal dyes that have insecticidal properties.

It cannot be stressed too strongly that the size of the *tao* is of crucial importance. If it is a fraction too tight, the fascicles will tend to buckle within it, and the paper will eventually become permanently distorted, so that the binding will cease to function correctly and damage will result. On the other hand, it should exert sufficient pressure on the fascicles to consolidate the text block and hold it firmly in place. If it is too loose, the fascicles will slide out, especially if the book is shelved vertically. The boards should therefore be measured out extremely carefully, as the entire success of the *tao* depends on this operation.

Special Preservation Techniques

The Chinese art of bookbinding has a long history, and each period has its characteristic style. The original style and appearance of the book should always be preserved when it is rebound. When a damaged old book has been interleaved and trimmed and had its endpapers and covers replaced, it may look brand new, but it will have been shorn of its period style, and both its antique value and its value to bibliographic research will have been lost. Therefore when repairing very early books, or rare books of particular value to bibliographic research, you should always try to preserve their antique features. Do not even think of restoring the text or retracing the text frames; in a rare old book, a single blurred character or break in the text frame may be of immense significance in determining the edition, so when you repair it, do not go restoring characters and touching up the text frames to make it look like a first printing. During the Qing dynasty, many of the fine editions from the Song, Yuan, and Ming that were kept in the palace library known as the Tianlu Linlang had their text restored and text frames retraced when they were rebound, which not only caused them to lose value as old books but also interfered with the evidence for determining their edition. This sort of destructive treatment should be carefully avoided.

Preserving the original appearance is a rather painstaking and complicated task. Before you set to work, you should take all the circumstances of each book into account, and keep an open mind when deciding on your approach. To this end you will need not only to have

a thorough mastery of repair techniques, but also to possess a little knowledge of printed editions and to understand the characteristics of each period; only then will you be able to repair an old book in such a way as to preserve its original appearance.

The processes described below for preserving the original appearance of a book are rather more difficult than ordinary repair work, and are expensive in both time and effort. But these are only a few of the more important procedures, and are certainly not to be considered a comprehensive account of this type of restoration work.

INTERLEAVING

Some rare books have inscriptions on their tail edge, which should be preserved intact when they are repaired, because such inscriptions are often a factor in determining the edition or provenance of the book. For example, many of the books collected in the Ming-dynasty Tianyige library at Ningbo have tail-edge inscriptions. From the calligraphic style and position of these inscriptions, it can be determined whether or not the books formed part of the original Tianyige collection. Sometimes there are annotations above or below the title of the book, which often have a close connection with its contents or author and are of the utmost documentary value. When repairing and rebinding such volumes, you should take great care to preserve these inscriptions, and avoid trimming or sanding them off.

Whenever you have occasion to interleave a book that has annotations very close to the head or tail of the leaf, or inscriptions on the tail edge, you should never trim it so that it looks new, nor should you use the normal method of interleaving. To preserve its original appearance, you should proceed exactly as follows: when the leaves have been sprayed, flattened, and properly folded, take a fascicle and place it on a wooden trimming board. Prepare as many sheets of interleaving paper as there are leaves, and place them in front of the leaves. They should be single sheets, cut slightly smaller than the leaves. If the book consists of several fascicles, do not cut all the interleaving sheets to size at once. As the fascicles of a book are not necessarily all the same size, deal with each fascicle separately so that the size of the interleaving sheets matches.

After you have cut the interleaving paper to size, follow the usual method for interleaving (see "Interleaving," above), inserting the interleaving sheets into the folded leaves of the book, level with the *shukou*. As the interleaving sheets are slightly smaller than the leaves of the book, their new edges will be concealed, and if the tail edge of the book has been inscribed, the inscription will be clearly visible once the book has been pressed. When interleaving in this way, always choose a paper whose color is in harmony with that of the book.

REPAIRING THE *SHUKOU* AND THE CORNERS

If the *shukou* of a rare double-leaved book has only split open along part of the leaf, you need only join the damaged part with a paper strip to preserve the original appearance of the book, thus keeping the extent of the repair to a minimum. The color of the paper strip should closely match that of the leaf, so that no trace of the repair is visible. If the damage to the *shukou* is only slight, you need not repair it before joining it up with the paper strip; just join the two half-leaves together with a strip of thin *mianzhi*, lightly pasted, which need not project beyond the edge of the leaf, so that the original appearance of the fascicle is preserved. When the repairs are complete, do not trim the book; simply cut off any excess paper at the head and tail of the *shukou* with a pair of scissors, and lightly polish the edges with fine sandpaper.

When a book has undergone many years of use, the four corners of the fascicle may have worn round, which is not only unsightly, but degrades the book as an object. Keeping in mind the principle of preserving the original appearance, you should restore the missing portions. First repair the damaged areas of the *shukou* and the corners with matching paper; then join up the *shukou*. To restore the missing portions of the corners use a paper slightly thicker than that of the leaf so that the fascicle is easy to beat down, and restore only two of the four corners of each leaf, rather than all four. Otherwise, when the fascicle has been bound, the extra layer of paper will make the corners much thicker than the rest of the book, and it will be impossible to beat them down. When the repairs have dried, fold the leaves, beat them down, and insert the paper twists to hold the fascicle together. Then place it on a wooden

trimming board, lay another board over it and hold it down with the left hand; trim off any projecting edges of repair paper with a small, sharp knife held in the right hand. Holding the book firmly between two pressing boards, lightly polish the edges with fine sandpaper.

REPAIRING THE COVERS AND ENDPAPERS

All the antique features of a fine edition should be preserved. Whether damaged or not, the covers and endpapers should be preserved along with the rest of the book if they are of comparable antiquity, and even leaves that are half missing or that contain only a few characters should never be discarded. Covers that bear book collectors' inscriptions are of particular value. For example, there are many fine editions among the books collected by Li Wentian (1834-1895) during the Xianfeng (1851-1861) and Tongzhi (1862-1874) periods of the Qing dynasty, but few of them bear seals. However, on many of the covers are inscriptions from which it is possible to determine whether or not they originally belonged to Li's collection. Then there is the Yuemantang collection of Li Ciming (1830-1894) of the late Qing, which consists entirely of ordinary Qing-dynasty editions, uniformly bound. Inside many of the books are annotations by Li Ciming, and although many of the covers bear inscriptions by him, as the calligraphic style is so nondescript, it is easy to overlook them and discard the covers. To preserve the antique appearance of books such as these, you should first remove the covers, then repair them, and finally line them. After removing the cover, line it on the reverse side using thin paste, then paste it onto the wallboard to stretch. When it has dried, re-use it. For lining old covers, you should use a strong *mianzhi*. In the case of silk covers, after removing them, fix them onto a varnished backing board with water, making sure that the warp and weft of the fabric are correctly aligned. Get rid of the excess water with blotting paper, and press the fabric firmly against the board. Paste the back of the silk evenly with thick paste, line it with a sheet of paper, paste it onto the wallboard, and after it has dried, re-use the cover. If the cover is damaged and incomplete, patch it with matching cover paper. If so much of the cover is missing that it is impossible to restore it, supply

a new outer cover, made of appropriately colored elegant paper, and remount the old cover inside the book. Restore incomplete endpapers in the same way.

FOLDING THE COVERS

To preserve the antique appearance of a book, you should never trim it. But if the corners have worn a little round, you should fold the covers a little round too to match the shape of the leaves. This operation is rather difficult. First you should cut some slits in the cover paper around the corner with a pair of scissors, and fold the edges in. Be careful when folding the edges in to follow the exact shape of the corners. Apart from the corners, there may be places at the head, tail, or *shunao* edges that are not as straight as when the fascicle was originally trimmed. In such cases you should never fold the cover in a straight line, but should cut slits in the places where there are curves, and fold the cover in accordingly, so that the cover conforms to the shape of the fascicle.

CORNER PROTECTORS

If the book has been fitted with corner protectors, the silk that has been used to cover them should be taken off and retained, so that after the book has been repaired, it can be re-used in the same way. If these pieces of silk are damaged and incomplete, they should be restored with some old material of matching color. Use the original pieces of silk for the tail corner protectors (i.e., for the corners that will show when the book is laid flat on a shelf), and any restored pieces for the head corners. If any of the original corner protectors bear characters, the lining should be removed very carefully to avoid damaging them, and when the book has been rebound, they should be refitted in their original position.

REPAIRING THE LABELS

Any labels that might be pasted on the covers should be repaired, whether complete or not. If the labels bear only the title of the book and not the chapter number, the complete ones should be pasted onto the

first fascicles of the restored book, and the damaged ones onto the last fascicles. But if the labels bear the chapter and fascicle numbers, they will have to be pasted onto the fascicles to which they correspond.

STITCHING AND PIERCING THE BINDING HOLES

When rebinding valuable printed editions, you should pay special attention to the thread used for the stitching, and on no account use new white thread, as this will certainly clash with the original color of the book. To avoid this, soak the thread in a decoction of black tea or acorn caps. On drying, the thread will turn cream, and will nicely match the color of the book. When stitching the fascicles, you should always use the original binding holes. If the original holes are not in line, block up one or two of them with paper twists before fitting the covers; then cut off the ends of the twists and beat them down. Fit the covers, then pierce one or two new binding holes correctly aligned with the remaining original holes, and do the stitching. By not repiercing all four binding holes, you will avoid damaging the *shunao* (see "Piercing the Binding Holes," above).

RESTORING THE TAO

If a book still has its original *tao* and the outer covering is damaged, find some of the same material to repair it with. If the paper lining of the *tao* is damaged, you will have to find some identical or closely matching paper to make the repair. After you have rebound the book and restored the *tao*, if the *tao* is too loose, you can either paste a thick paper lining inside it or add a sheet of thin cardboard to the inside flap, so that it fastens up tightly enough. If the *tao* is too tight, spray it with water and beat it out with a hammer until it fits properly.

Xiao Zhentang does not discuss the repair of *jiaban* ("pressing boards") or *muxia* ("wooden boxes"), possibly because that is more a matter for the carpenter than the book restorer. It is worth pointing out, however, that sometimes *jiaban* are found to have shrunk with the passing of time, especially if the book has been stored in overly dry conditions, so that their width is often less than that of the book, and the tapes cut into the book as they are tightened. In such cases the *jiaban*

should be removed and the book provided with either new ones or a wrap-around *tao*. The original *jiaban* can be retained and stored separately if they are valuable or inscribed.

OTHER BINDING STRUCTURES

The "Jade Set in Gold" Binding

The "jade set in gold" binding is the most sophisticated Chinese binding structure, and is used principally for the preservation of fine editions. (See plates 15 and 16.) The origin of the term "jade set in gold"

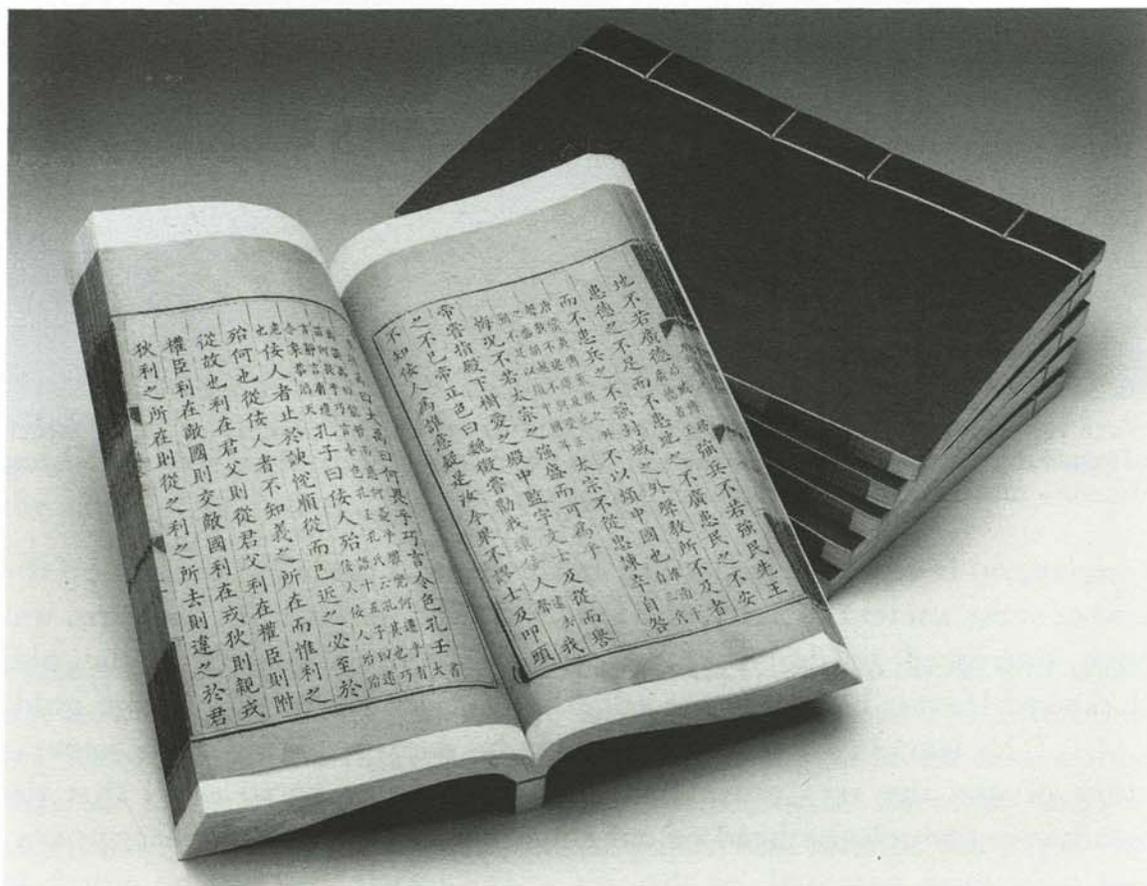


PLATE 15. "Jade set in gold" binding. Although this is a fine Ming-dynasty edition, it has been printed on a very thin bamboo paper which has tended to become brittle. The paper has been carefully repaired, and given a "jade set in gold" binding, which has allowed the binder to trim the book, thus giving it a pristine appearance, while preserving every fragment of the original paper. This is another of the books in the Backhouse Collection that were restored in the Liulichang at the beginning of the century, and is a masterpiece of the Chinese art of book restoration. Bodleian Library, Backhouse 576.



PLATE 16. "Jade set in gold" binding (detail). The extra strip of interleaving paper, which compensates for the thickness of the leaf, has been slipped out to show how this binding structure functions. Bodleian Library, Backhouse 576.

(*jinxiangyu*) is very old. According to the story, a piece got broken off the seal of some ancient dynasty, and gold was used to repair it. The term was then borrowed to describe this type of binding, in which the old, darkened leaves, like jade, are edged with new white paper, like gold.

The leaves of a fine edition may be damaged after many generations of use; the area outside the text frame may be so small that the annotations touch the head or tail edges; the leaves of a manuscript may not have been trimmed; or the size of the leaves may not be equal; in each of these cases a "jade set in gold" binding should be used. The advantage of this format is that at the head, tail, and *shunao* edges of the book, only the interleaving paper is exposed, thus safeguarding the leaves of the book itself; also, if the leaves are of unequal size, they can be made

uniform by this format without excessive trimming, thus preserving the book while giving it a pristine appearance.

First repair any damaged leaves, as described above (see "Repairing Paper"). Be sure to repair any of the old binding holes that are near the text frame, as these may be visible after the book has been rebound, and will spoil the appearance of the finished work. After making the repairs, spray the leaves, turn and dry them, press them flat, fold them, beat them down, align them, and then fasten them together temporarily with single-pointed paper twists. Finally, trim the head and tail edges by hand, but not the *shunao* edge. If the head and tail edges are already fairly even, or if there are any annotations close to them, do not align or trim the leaves; they can be evened up by simply trimming them off with a pair of scissors or sanding them. Having completed these preliminaries, proceed with the following operations.

SELECTING THE PAPER

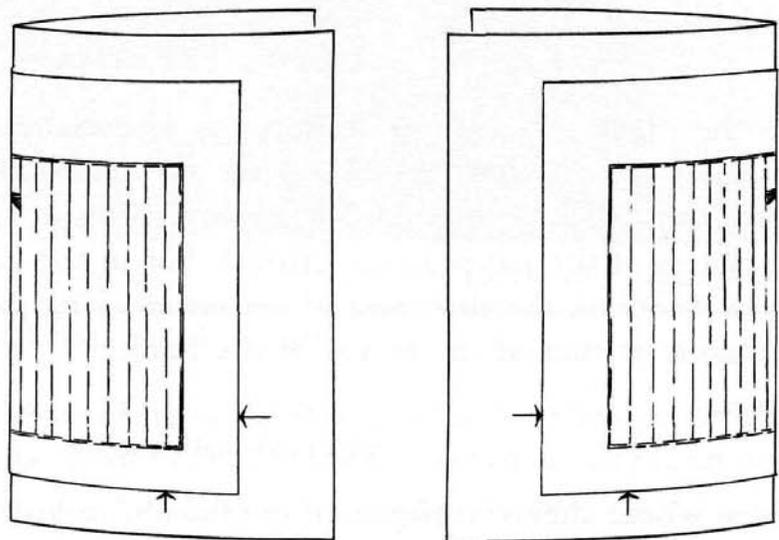
As the "jade set in gold" binding is essentially an elaborate form of interleaving, the best papers to use are *luowenzhi* and *mianlian zhi* on account of their softness and flexibility. With ordinary interleaving, the thickness of the paper is not critical, but in the case of the "jade set in gold" binding, the thickness of the interleaving paper should be exactly the same as that of the leaves of the book.

CUTTING THE PAPER

Place whole sheets of paper on the bench, measure the book, and work out how the interleaving sheets are to be cut from them. The interleaving sheets should be three or four centimeters bigger in all dimensions than the leaves of the book, to allow for the folding in. Carefully find the right side (i.e., the smooth side) of the paper, and arrange the paper the same way up in staggered batches of thirty to forty sheets. Spray the paper evenly, making sure that it is neither too moist or too dry. If it is too moist, you will not be able to use it straight away, and if it is too dry, you will not be able to get rid of all the creases. If you do not spray it evenly, tide marks may be left on the paper. Then roll the paper up and

leave it for ten minutes or so until the moisture has permeated it evenly throughout. Unroll the sheets and straighten them up, and put a pressing board on top of them to make them lie flat. When they have dried, trim off any rough edges so that the sheets are all exactly the same size. Fold one sheet in half, and with a folded leaf of the book, determine how far the interleaving should project beyond the head and tail edges of the book. It should normally project a little more at the head than at the tail. If, for example, it projects two centimeters beyond the head edge, it should project a centimeter and a half beyond the tail edge when the binding is finished. At this stage, at least double that amount should be allowed. Make pinpricks in the interleafing paper at the left and right sides of the tail edge of the leaf of the book, and at the corner of the *shunao* edge (figure 38). Remove the leaf of the book; then unfold the

FIGURE 38



sheet of interleafing paper with the pinpricks in it, and lay it over the whole pile of interleafing sheets. Make pinpricks through the whole pile, using the pinpricks in the top sheet as a guide. These pinpricks will indicate exactly where the leaves of the book should be mounted on the interleafing sheets.

MOUNTING THE LEAVES

In this operation, the leaves of the book are pasted one by one onto the interleaving sheets. Before you start, lay a sheet of blotting paper on the bench as an underlay. Remove the paper twists from the book, and place the leaves in a pile on the right of the bench, at the front. Place the

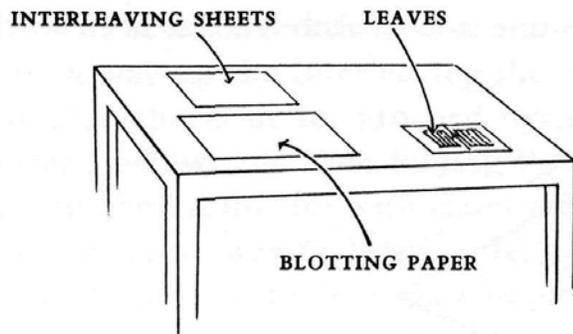


FIGURE 39

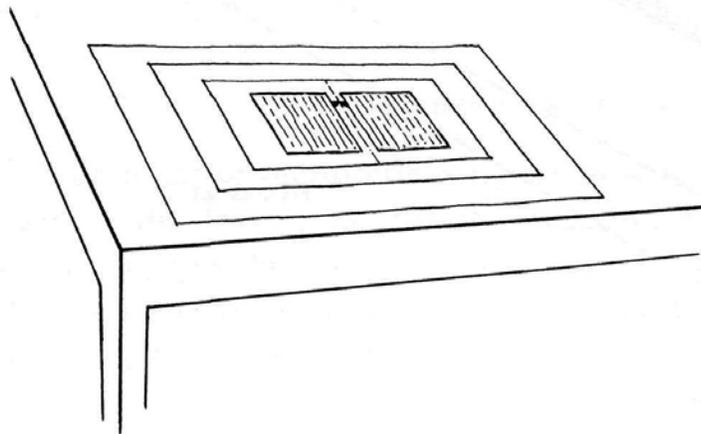


FIGURE 40

interleaving sheets directly in front of you behind the sheet of blotting paper, and thus rather further toward the back of the bench than the book (figure 39). The interleaving sheets should have the right side uppermost. Take one, and lay it on the blotting paper; open out a leaf of the book, and lay it the right way up on top of the interleaving paper, in line with the pinpricks (figure 40). Then take another interleaving

sheet and another leaf of the book, and continue in this way until you have a pile of forty to fifty sheets, consisting of alternate interleaving sheets and leaves of the book. Then place a straightedge across the *shukou*, and weight it down with a stone or some other heavy object. Lift up one side of the pile and fold it over the straightedge; then bring down one sheet of interleaving paper and one leaf of the book. Apply two little spots of paste to the back of the *shunao*, so that the leaf sticks to the interleaving sheet (figure 41). When one side of each leaf has been stuck

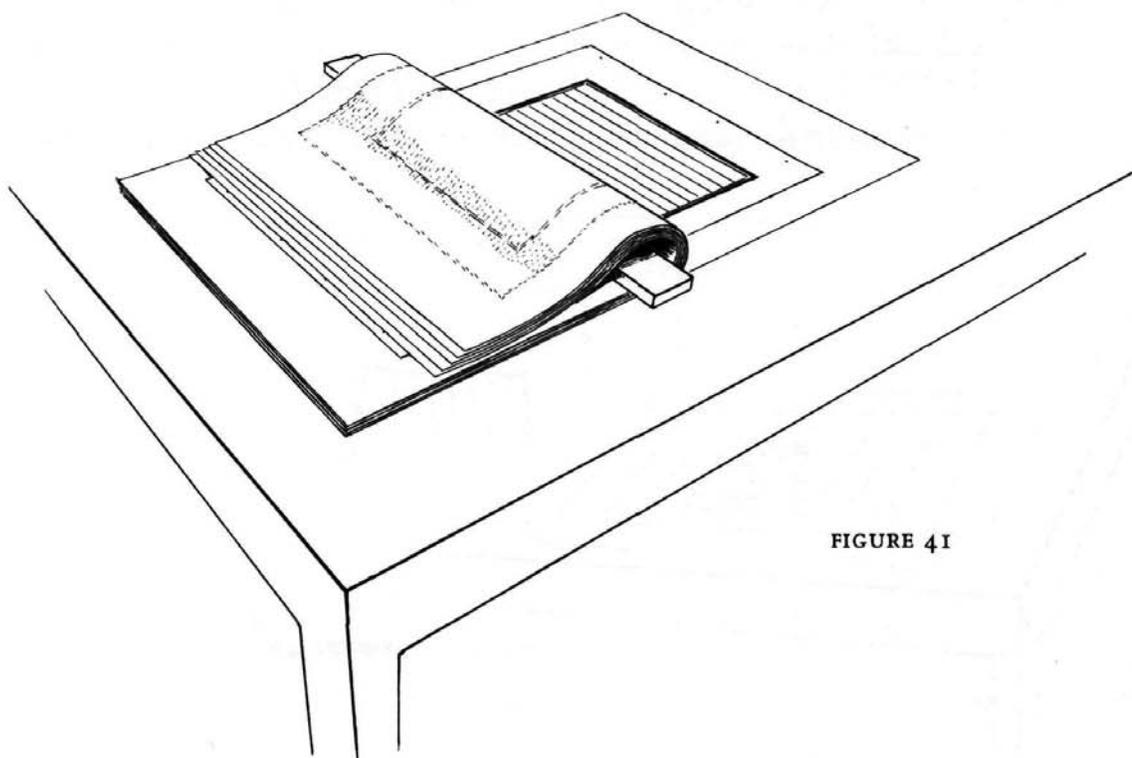


FIGURE 41

down, turn the book and deal with the other. When the whole pile has been done, put it to one side of the bench weighted down with a wooden board. Then do the next pile, and so on until the whole fascicle has been dealt with.

Another way of mounting the leaves is to pile both the leaves and the interleaving sheets with the reverse side uppermost. Then take first a leaf of the book, followed by a sheet of interleaving paper. When you have made a pile, stick the leaves to the interleaving sheets by the above

method, applying spots of paste to the left and right sides of the leaves, outside the text frame.

A third way is to apply the paste as you take each leaf, then position the interleaving sheet over it, and smooth it down with both hands, starting at the middle and working outward. Then take the next leaf, and so on. This method is slower than the previous two, but the leaves are less likely to be mounted askew.

There is a fourth way, in which no paste is used, nor does it matter which way up the interleaving sheets are. When you have positioned a hundred sheets or so, proceed straight to folding the edges in, as described below, and then folding the leaves down the middle. Although this method dispenses with the need to use paste, the interleaving paper must be cut slightly larger, the leaves must be positioned perfectly straight, and the folding must be done as deftly as possible so that the leaves are kept exactly in place on the interleaving sheets. This method is more suitable for rough papers. If the paper is smooth, you must be particularly careful to ensure that the leaves and the interleaving sheets do not go askew.

FOLDING THE EDGES IN

All four edges of the interleaving are now to be folded in level with the edges of the leaves, so that the edges of the interleaving sheets that project beyond the leaves are of uniform thickness. To do this, place a pile of forty or fifty mounted sheets face down on the pasteboard, and lay a pressing board over the top half of it, weighted down with something heavy. Fold the other half of the pile back over the pressing board. Get a strip of dark-colored paper ten centimeters wide and thirty centimeters long, and place it on the pasteboard. The color must be dark, so that you can clearly see the head edge of the leaf, and so fold the interleaving exactly up to it. Bring down one leaf of the book and one interleaving sheet, and fold the projecting edge of the interleaving sheet exactly level with the tail edge of the leaf (figure 42). Make sure that the edge of the interleaving sheet does not overlap the edge of the leaf; the two should be exactly in line (figure 43). Then take the dark colored paper strip and place it on top of what you have just folded, bring down the second leaf

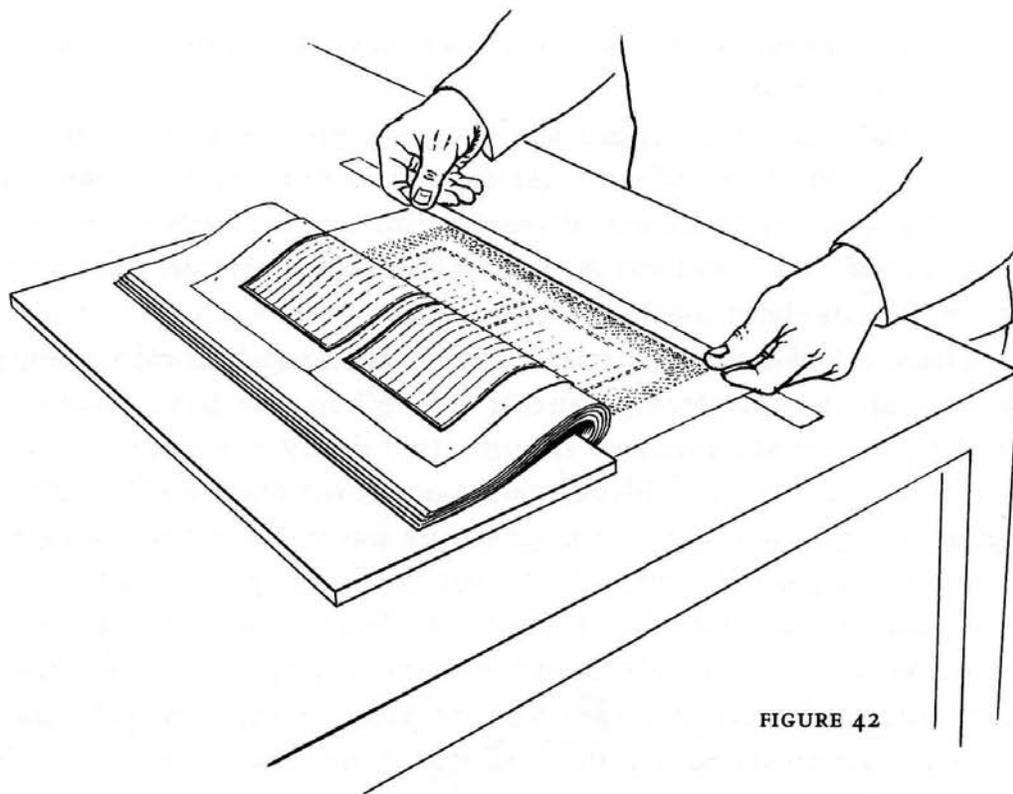
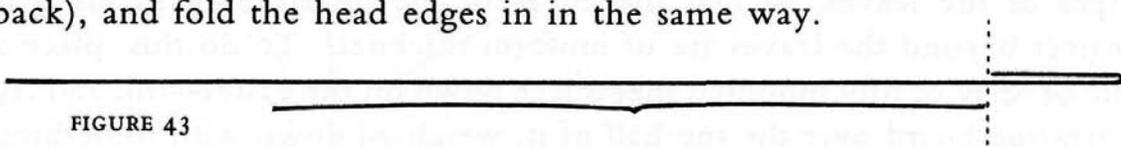


FIGURE 42

and interleaving sheet, fold the edge in, and continue in this way until the whole pile has been done. When all the tail edges have been folded in, turn the pasteboard, weight down the tail edges (which are now at the back), and fold the head edges in in the same way.


 FIGURE 43

Now turn the pasteboard so that it runs across the bench (from front to back), and before you fold the *shunao* edges in, make cuts in the folded interleaving at the head and tail, half the distance between the *shunao* edge of the interleaving and the edge of the leaf, and level with the head and tail edges of the leaf (figure 44a), so that when you fold the *shunao* edge in there will not be a double thickness. Fold all the *shunao* edges in on one side of the book (figure 44b); then fold the *shunao* edges in on the other side in the same way. When all the edges have been folded in, lay a pasteboard on top of the pile and put it to one side until you are ready to fold the leaves.

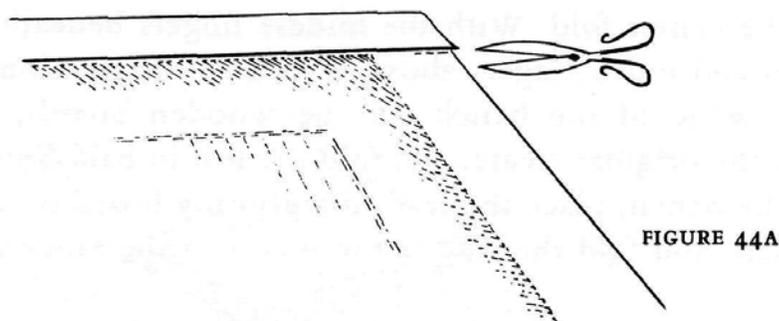


FIGURE 44A

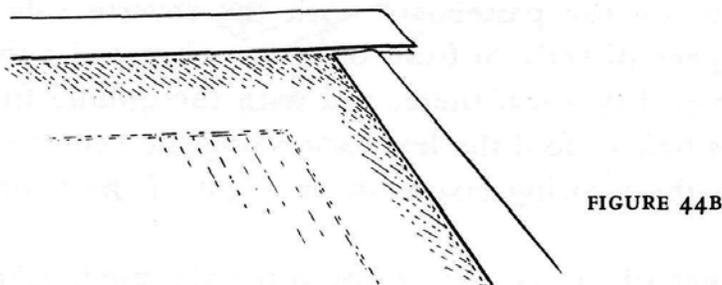


FIGURE 44B

As each pile is finished, smooth the edges down and check that they are the same thickness as the central part of the leaves. If the interleaving paper is thicker than the leaves of the book, there will be a depression in the middle. This can be remedied by opening out the folded edges of an interleaving sheet every few leaves throughout the fascicle. If the interleaving paper is thinner than the leaves of the book, the central part of the fascicle will be too thick. To bring the edges up to the same thickness, stick paper strips onto the folded edges of the interleaving every few leaves, so that the fascicle is completely level.

FOLDING THE LEAVES

• Method 1

Place the leaves on the pasteboard across the bench with the text side up and the head margin to the left. Leave some bench space clear directly in front of you, and lay a sheet of clean white paper on it. With both hands, pull forward one leaf so that the center of the *shukou* is directly over the edge of the bench. If the edge of the bench is uneven, place a wooden board that has a good edge on the bench, and use that instead

to crease the center fold. With the middle fingers beneath the leaf and the thumbs and index fingers above it, make a crease along the *shukou* against the edge of the bench (or the wooden board), in the same position as the original crease, and fold the leaf in half. Smooth the fold down on the bench, place the leaf on a pressing board on the right side of the bench, and fold the rest of the leaves in the same way.

• *Method 2*

Place the leaves on the pasteboard with the reverse side uppermost. Leave a clear space directly in front of you, and spread a sheet of clean white paper on it. Lay a leaf there, and with the middle fingers on top and the thumbs below, fold the leaf back along the center of the *shukou* and place it on the pressing board on the right of the bench.

Whichever of the two methods you have used, take the folded leaves thirty or forty at a time by the head and tail edges, and even up the *shukou* against the bench. If you find that the leaves of the book and the interleaving sheets are pulling against each other so that they will not lie flat, prize them apart with a bone hairpin or a large needle at the *shunao* edges where you have applied the paste; even them up again so that the leaves and the interleaving will slide into position and lie flat against each other. Then proceed with the beating down and the rest of the procedures involved in completing the binding, as described in "The Thread Binding," above.

The Rough Binding

The rough binding is often used for manuscripts that have annotations at the head and tail of the leaf, so that they cannot be trimmed.

First repair the leaves, beat them down, and press them. Cut some paper to size for making double-leaved covers, and fold them in half. Unfold the lower cover, and place it on the awl board with the exterior side uppermost and the crease horizontal. Place the leaves on top of it, aligning the *shukou* with the crease in the cover, and with the *shunao* edges toward the front of the bench. Then place the unfolded upper cover on top of the leaves with the exterior side downward, aligning the crease with the *shukou*. Weight it down with a straightedge (figure 45).

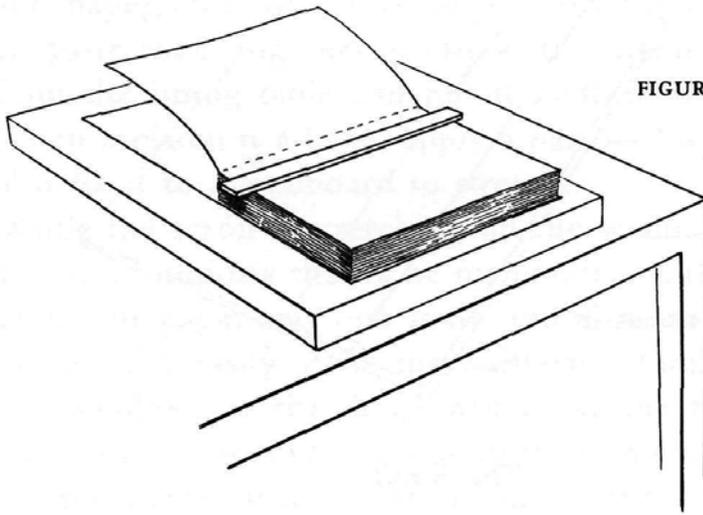


FIGURE 45

Pierce two sets of double holes in the *shunao* at an equal distance from the *shunao* edge and insert double-pointed paper twists through them. Turn the fascicle over, and tie the ends of the paper twists together. Stick the paper twists down on both sides of the fascicle with thick paste, strike them lightly with the hammer a couple of times, and fold back the outer halves of the covers and stick them down. In this method, the outer halves of the covers conceal the paper twists.

The paper twists may also be inserted through the whole cover, so that they are not concealed. In this case the covers are not unfolded, but simply aligned at the *shukou* with the leaves of the book, and the holes are pierced through both halves of the cover. Insert the paper twists from the front, tie them at the back, and beat them down with the hammer.

If there is any text so close to the *shunao* edge that the paper twists cannot be inserted, fold this part of the leaf back, prepare a strip of paper of the same length as the book and of an appropriate width, paste one edge onto the reverse side of the leaf that has been folded back onto the inside edge of the fold (figure 46), and fasten the other edge into the binding with the paper twists. In this way the text will be visible, and it will be possible to read the book.

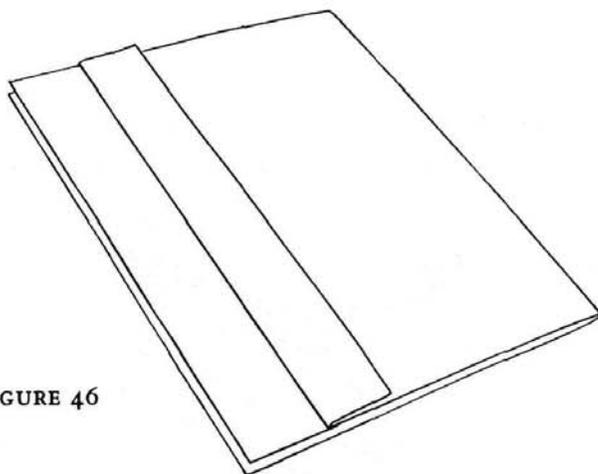


FIGURE 46

The Scroll

The scroll is the oldest way of binding paper books, and was in continuous use from the end of the Eastern Han (third century C.E.) to the beginning of the Song (tenth century). Its heyday was during the Sui and Tang (seventh and eighth centuries). Scrolls are repaired and mounted as follows.

First unroll the damaged scroll carefully with a pair of tweezers. Separate it into sections of three or four leaves, so that no section is more than two meters long. Spread a section out, text downward, on a long lacquered lining table, with a sheet of thin paper under it. Wet it on the back with a *paibi*, so that it lies perfectly flat on top of the paper. If the scroll has been lined, remove the lining with a pair of tweezers. If the paper is decayed and it is not easy to lift off the lining with tweezers, rub it off little by little with the middle finger of the right hand. Do this gently, so as not to destroy any of the text on the other side. Repair any damaged areas with matching paper. If the section consists of several separate leaves, join these together with thick paste at the appropriate margin. Holding the *paibi* in the right hand, paste the back of the scroll all over with thin paste, from left to right. Cut some sheets of paper of the *mianzhi* type a couple of centimeters taller than the scroll at both head and tail, and roll them up one by one into a single roll. Holding the roll in the left hand, and a *zongshua* in the right, line the scroll by unrolling the lining paper from right to left. Smooth the lining paper

firmly down onto the scroll with the *zongshua*. If the scroll is longer than the lining paper, you will have to join several sheets of lining paper together; paste them together firmly at the margin. Remove the lined scroll from the lining table and put it aside to dry for seven or eight hours. Then moisten it a little, apply a narrow line of thin paste to the edges, and fix it to a wallboard to stretch.

While the scroll is stretching on the wallboard, the right degree of warmth and humidity should be maintained in the room. If the room is too warm, the paper may tear apart, and if the room is too humid, the paper will not dry easily. Also, the wallboard should not be placed near a door or window, or the drafts will cause the paper to dry out too quickly and tear. In winter you should try to maintain a temperature of fifteen to seventeen degrees centigrade in the room, with a relative humidity of 50–60 percent. Under these conditions, the paper will dry gradually, without tearing apart.

When you paste the scroll onto the wallboard, leave a little gap about four to five centimeters long in one edge, and blow into it so that the middle (i.e., unpasted) part of the scroll comes away from the wallboard a little; then paste the gap down. In this way, it will be easy to remove the scroll from the wallboard once it has dried. After the scroll has stretched for two or three days, prize it gently off the wallboard with a bamboo knife. Then, with a small knife, trim straight the ends that are to be joined, and paste the sections together in the correct order using thickish paste, so that you have a complete horizontal scroll. Wait until the paste at the joins has dried; then place the whole scroll onto a trimming board. Take a sheet of paper and line it up with the tail edge of the scroll, make pinpricks every forty centimeters, and using these as a guide, trim the edge straight with a large rule and a paper-cutting knife. The rule can be held down with some heavy stone or metal object. Then roll the scroll up, and with the tail edge downward, level it up against the bench. Make a pinprick through the scroll near the head edge, open it out on the trimming board, align the rule with the pinpricks and trim the head edge in the same way as the tail edge. Then roll the scroll up again and polish the head and tail edges smooth with sandpaper. Finally, unroll the scroll again, and stick the end onto a wooden roller (figure 47).

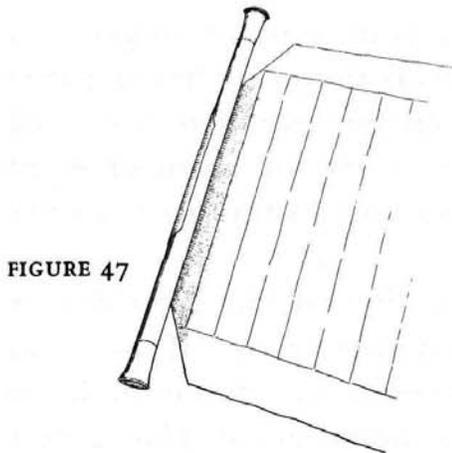


FIGURE 47

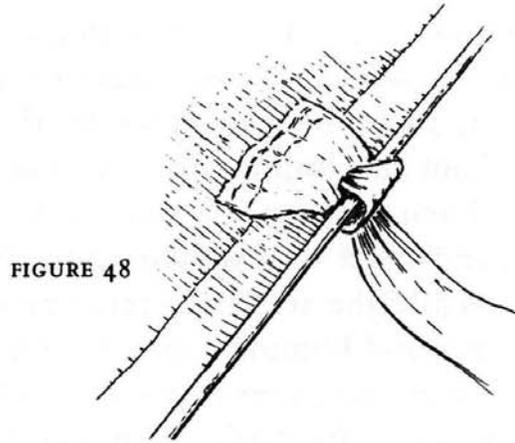


FIGURE 48

This roller is called the *dizhou* ("earthly axis"), and each end should protrude by one centimeter. Paste a sheet of plain paper about thirty centimeters long onto the beginning of the scroll; this is called the *biao* ("mount") or *hushou* ("front protector"). Paste a very thin bamboo strip into the end of the *hushou*; the ends of the bamboo strip should be level with the edges of the scroll. This bamboo strip is called the *tianzhou* ("heavenly axis"). Attach a length of cotton tape or silk ribbon into the center of the *tianzhou* (figure 48), and stitch a bone or bamboo peg into the other end of the tape. A paper label inscribed with the name of the book and the number of the scroll may be pasted on the outside of the *hushou* next to the *tianzhou*.

If the scroll is damaged but the paper is not decayed, it will not be necessary to line it as described above; simply repair the damaged areas with matching paper, and omit the lining. Nor will it be necessary to trim the head and tail edges; just beat down the repairs, trim off any untidy edges with a pair of scissors, and make up the scroll as above. It is particularly important in the case of very old scrolls not to remove the lining, as in lifting off one layer of paper you run the risk of damaging or blurring the text on the other side. In the old days they used to sum it up by saying that removing half the paper would take the life out of the text. More precisely, removing a layer of old paper from an ancient scroll and replacing it with a layer of new paper will alter its original appearance; and if, having done this, you then go on to trim the scroll, physically reducing its size, the loss will be even greater.

The Fold Binding

The fold binding evolved from the scroll, and is repaired as follows.

First take the book apart, separating the leaves at the joins, and then repair any damaged areas with matching paper. Beat the repairs down, trim off the head and tail edges with a pair of scissors, and stick all the leaves together again with thickish paste. Fold the fascicle up along the original folds, add plain white endpapers at front and back, and fit fully folded covers as described above (see "Making the Covers").

If the paper of the book is decayed, in addition to repairing the damaged areas, you will have to line the book; the method is exactly the same as for scrolls.

The Butterfly Binding

The butterfly binding does not make use of either paper twists or thread, but only paste applied to the *shunao* edge of the book. It can have hard covers. Its advantages are that the *banxin* is inside the book and therefore not easily abraded; if the *shukou* and the head and tail edges are damaged, they can be trimmed straight without taking the book apart; and since the whole leaf is visible when the book is opened, this binding structure is most suitable for books of illustrations, maps, and so forth that are printed over the whole leaf. The butterfly binding is also commonly used in the old printed editions of the Song and Yuan. There are several ways of constructing it, which are described below.

BUTTERFLY BINDING METHOD I

First fold the leaves in half along the *banxin*, with the text inside, and provide front and back endpapers folded in the same way. Align the text frames from the reverse side of the paper. If the paper is so thick that you cannot see the text frames clearly, align the leaves to the tail edge. Then press them. Then level up the folded leaves, place a pressing board neatly on top of the fascicle, with the folded edges protruding, and weight it down with a stone or other heavy object so that it does not move. Move the fascicle with the pressing boards to the edge of the bench. Then lift up the folded edges with the left hand, and holding a *zongshua* in the right hand, apply a little thick paste to them so that it penetrates into the

shunao of the book by about one millimeter; or evenly paste the folded edges back and forth and up and down with the *zongshua* until the paste gradually penetrates. Then push the fascicle completely into the pressing boards, with a strip of paper stuck firmly onto the *shunao* edge. Stick a strip of paper onto each fascicle, and when it has dried, the covers can then be fitted. If there are several fascicles between one pair of pressing boards, a single strip of paper can be used to line the *shunao* of the entire stock all at once, and the fascicles can be separated with a knife when they have dried. The method of fitting the covers is the same as for the *baobeizhuang* (see "The Soft Wrapped-back Binding Method 1," below).

BUTTERFLY BINDING METHOD 2

After folding the leaves, arranging them into fascicles, and supplying endpapers, place a fascicle on the bench with the folded edges facing toward you. Place a pressing board over half the fascicle, so that the folded edges protrude, and weight it down with a stone. Raise the leaves with the left hand, and apply three or four spots of thin paste, evenly spaced, to the folded edges. The leaves will then all be stuck together. Fit covers as in method 1.

The advantages of this method are that it does not damage the *banxin*, and that it is easy to open the book flat. Its disadvantage is that as only a little paste is used, the binding is less secure than in method 1, and is apt to fall apart. The famous Qing-dynasty book collector Huang Peilie (1763–1825) often used this method, so it is now generally referred to as a "Huang binding."

BUTTERFLY BINDING METHOD 3

This is really a stitched binding. When the book is open it looks like a butterfly binding, but from the *shunao* and tail edges it looks like a thread binding. This binding structure was first used for the painting manual *Jieziyuan huazhuan* which was printed during the Kangxi period (1662–1722) of the Qing. It was chosen in recent times by the Shangwu Yinshuguan for their reproduction of the Ming edition of the novel *Sanguozhi yanyi*.

First repair the leaves, spray and flatten them, dry them, and fold them with the text inward. Select some paper of the same color and thickness as the leaves of the book (it may be a little thicker, but no thinner), and cut it into strips five centimeters wide and the same length as the leaves. Place the leaves vertically on the pasteboard in batches of ten or so with the folded edges to the right, and slide them out to the left one by one until the pile is staggered, with half a centimeter between each edge. Cover the top leaf with a sheet of paper, leaving a half-centimeter of the edge exposed. Paste all the folded edges with thickish paste, and stick a paper strip onto each of them, starting at the bottom of the pile and working to the top (figure 49). Then place a sheet of paper

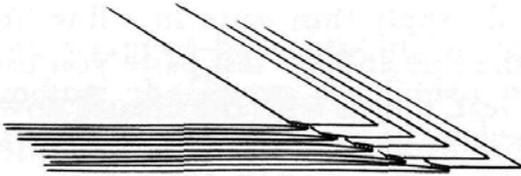


FIGURE 49

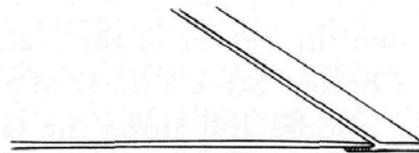


FIGURE 50

over the pile and smooth it down with the right hand, so that the leaves and the paper strips are stuck firmly together. Remove the leaves from the pile one by one and place them on another pasteboard, and deal with the second batch in the same way.

When you have finished the whole book, take the leaves in batches of seven or eight and pile them up to dry on a pasteboard with a sheet of blotting paper between each batch. Weight the pile down with a pressing board and a stone. After the leaves have dried, arrange them in order, and fold in the free edge of the paper strip flush with the folded edge of the leaf (figure 50), following the method for extending the *shunao* of noninterleaved books described above (see "Extending the *Shunao*"). Proceed with the beating down, pressing, inserting paper twists (through the paper strips), trimming, and so forth, and the first stage is complete. And when you have fitted corner protectors and covers, and done the stitching, from the outside you will not be able to distinguish the result from an ordinary thread binding.

APPLYING THE "JADE SET IN GOLD" BINDING TO THE BUTTERFLY BINDING

If a book with a butterfly binding is too small, this defect can be remedied by applying the "jade set in gold" binding to it. This binding structure is typical of the Chinese art of bookbinding, and is a good example of how to conserve the original features of a rare book when rebinding it. It is done as follows.

Cut to size as many sheets of paper as there are leaves of the book; they should be bigger than the leaves on all four sides by as much as the "jade set in gold" binding is to protrude. Spray and flatten them, and taking thirty or forty sheets at a time, crease them down the middle, and along the tail edge at the point where the "jade set in gold" is to extend. Open out a leaf of the book, which will have been properly repaired, and place it text downward on a pasteboard. Apply thin paste in a fine line down the center of the leaf; the finer the line and the less paste you use, the better. Stick a sheet of paper to the leaf, in line with the creases down the middle and along the tail. When you have done all the leaves, put a pressing board on top of them until they are dry. Prepare some paper strips for the head, tail, and side edges of each leaf, as wide as the protrusion of the interleaving paper. Lay a pile of forty or fifty leaves, text downward, horizontally across the pasteboard. Weight the head half of the leaves down with a pressing board, and fold the tail half of the pile back over the pressing board. Let the leaves down one by one, and lay a strip of dark paper under the edge of the leaf so that you can see it properly. Apply three or four spots of thin paste to the wrong side of the protruding edge of the interleaving paper, and stick a strip of paper level with the dark paper guide. When you have stuck strips on all the tail edges, turn the book and deal with the head edges in the same way. Then do the side edges. When strips have been stuck onto all four edges of the leaves, place a board on top of the pile, weighted down with a stone, until the leaves are dry. Then fold them (text inward), and striking the stone, lightly beat them down all over with a hammer. Align the leaves to the tail edge, and put the book into the press. Then proceed with the binding as described above (see "Butterfly Binding Method 1"). When the book has dried, cover the bound edge with a pressing board, and

lightly stick each pair of interleaving sheets together at the *shukou* edge with three spots of paste, so that the paper strips are not visible when the book is opened. Then complete the binding by trimming the book and fitting the covers.

The Wrapped-back Binding

If the *shunao* is narrow and cannot conveniently be extended, with the result that the book is difficult to stitch, the wrapped-back binding may be used. There are both soft-backed and hard-backed forms of this binding, and I describe two methods for constructing the former, and one for the latter, as follows.

THE SOFT WRAPPED-BACK BINDING METHOD I

The wrapped-back binding is completely different from the butterfly binding: the leaves are folded with the text outward, the *banxin* is exposed at the *shukou*, and endpapers are used. After aligning the text frames, put the fascicle between two pressing boards, and press it firmly so that it is perfectly flat and consolidated. Place the fascicle on an awl board, and pierce double holes about a centimeter and a half apart in the head, middle, and tail of the *shunao*, outside the text frame. Make double-pointed paper twists from strips of *mianzhi* about ten centimeters long and four centimeters wide. Insert three into each fascicle through the holes you have pierced, turn the fascicle over and pull the ends through firmly, tie them tightly together, and beat the knot flat with a hammer. Trim the book and polish the edges smooth. Place a fascicle between pressing boards with the *shunao* edge overhanging the edge of the bench, and weight it down with a stone. Cut out a strip of white paper the same length as the book, apply some thick paste to the *shunao* edge of the fascicle, and stick the paper strip onto it. Alternatively, paste the *shunao* edges of all the fascicles at once, stick a whole sheet of paper onto them, and cut the fascicles apart with a knife when the paste has dried. Then proceed as follows.

First cut the cover paper to size; it should be one centimeter bigger in all dimensions than the book, and the upper and lower covers,

as well as the *shunao* edge, should be a single sheet of paper, left unseparated. If the paper curls up or wrinkles and will not lie flat, spray the book and put it into the press. Then fold in one *shukou* edge of the cover by one centimeter.

Place a fascicle on a pressing board with the *shukou* facing toward you. Apply three or four spots of paste, equally spaced, to the edge of the endpaper. Holding the cover in both hands, align the folded edge with the *shukou* and stick it down, and place a pressing board on top of it weighted down with something heavy. Turn the fascicle by the pressing boards so that the tail edge is facing toward you; then slide back the top pressing board by one-third the length of the book. Make a good crease along the overhanging edge of the cover by pressing it against the tail edge of the book, and fold it in flush with the tail edge. Cut out part of the folded portion at the *shukou* with a pair of scissors to form a miter when it is folded in (see "The Fully Folded Cover" under "Making the Covers," above, and figure 16); then stick it down firmly to the tail edge of the endpaper with a little thick paste. Be sure to stick the folded edge down firmly to itself at the point where it passes around the *shunao* edge of the fascicle; otherwise there will be a hollow there when the cover is eventually stuck to the *shunao* edge of the fascicle. Then turn the fascicle again by the pressing boards so that the head edge faces you, and deal with that in the same way. Then with the *shunao* edge of the book facing you, make a crease in the cover by pressing it against the *shunao* edge with the right hand. Fold the cover around the *shunao* edge of the fascicle, but do not stick it down yet. With the front of the fascicle still facing upward, place a pressing board over the *shukou*, covering one-third of the fascicle. Lift up the cover, and apply some thick paste to the *shunao* edge of the fascicle and to the paper twists; stick the cover down firmly. Smooth the paper down firmly along the *shunao* edge of the fascicle with the oblong handstone, and turn the fascicle over. Apply three spots of paste to the head and tail edges of the lower endpaper, and stick the cover down onto it. Then fold in the upper cover flush with the *shukou*, cut away the double thickness at the corners with a pair of scissors, and stick the cover down with thick paste. After you have bound a fascicle, make all the folded edges of the cover crisp with the oblong

handstone, and place the fascicle between pressing boards weighted down with a stone to keep it flat. Then bind the next fascicle in the same way.

THE SOFT WRAPPED-BACK BINDING METHOD 2

Fold a sheet of cover paper in two with the right side inward, so that one side is slightly bigger than the other. The extent to which it is bigger is determined by the thickness of the fascicle. Then take the fascicle and place it in front of you with the *shunao* edge toward you, and apply three or four spots of thick paste to the endpaper, near the *shunao* edge of the fascicle, with the middle finger of the right hand. As you will have to lift the cover up to fold the head and tail edges in, do not apply paste to the very ends of the *shunao* edge. Now take one of the covers, with the shorter side downward, align the folded edge with the *shunao* edge of the fascicle with equal amounts extending at head and tail, and stick it down firmly. Then place the second fascicle on top of the first, and stick the cover on in the same way. When you have finished them all, turn the whole book over and put it to one side. Take the first fascicle again and place it in front of you. Open out the folded cover, and bring it around the *shunao* edge to the other side of the fascicle. Holding the cover down with the left hand, make a crease in it along the *shunao* edge of the book with the right hand; place a pressing board over it weighted down with something small and heavy. Turn either the head or tail edge of the fascicle toward you, slide the pressing board back to expose one-third of the book, and make a crease in the overhanging cover against the edge of the fascicle. Then turn the other edge toward you and crease the cover in the same way. Remove the weight, turn the fascicle over, and crease the overhanging head and tail edges of the other side of the cover in the same way. Then open the whole cover out, and fold in the head and tail edges. Make sure that the folded edges are pasted down firmly at the point at which they will pass around the *shunao* edge of the fascicle; otherwise there will be hollows at the head and tail of the *shunao* edge when the binding is finished. With the cover hanging down, place the fascicle on the bench with the *shunao* edge level with the edge of the bench, and put a pressing board over the *shukou*, covering one-third of

the fascicle. Apply some thick paste to the *shunao* edge, and also apply a little to the endpaper near the *shunao* edge. Bring the cover up and wrap it closely around the fascicle, and press it down with a pressing board. Put a piece of thick paper over the *shunao* edge, and press it down with a hard instrument so that it adheres firmly. Finally, turn the fascicle so that the *shukou* faces toward you, and slide the pressing board back to expose one-third of the fascicle. Make a crease in the overhanging edge of the cover against the edge of the *shukou*, fold the cover in, and cut it away at both corners with a pair of scissors to form a miter. Apply a couple of spots of paste to the head, tail, and *shukou* edges of the endpaper, and stick the cover down firmly. Turn the fascicle over and deal with the other cover in the same way; then put it aside weighted down with a pressing board. Then deal with the remaining fascicles, and when you have finished the whole book, put a pressing board over it, and leave it weighted down with a stone until the paste is dry.

THE HARD WRAPPED-BACK BINDING

In the earliest form of the wrapped-back binding, hard covers were used, and the structure resembles modern hardback bindings. An example dating from the sixteenth century is the large-scale encyclopedia *Yongle dadian*.

Before you insert the paper twists, fold back a single leaf of the upper and lower endpapers so as to expose the *shunao*. Prepare some strips of strong cotton cloth five to six centimeters wide and the same height as the book, and paste one on the front and one on the back of the *shunao*, so that half the width of each strip is overhanging the *shunao* edge of the fascicle. When they have dried, pierce six holes (i.e., three pairs of two) through the strip of cloth and the *shunao* at the head, middle, and tail; insert three double-pointed paper twists through them from the front of the fascicle; and tie them together at the back. (When you are making these paper twists, you can strengthen them by rolling in a few strands of silk thread.) Beat the knots down flat with a hammer. Unfold the edge of the endpaper that you had folded back, and paste it down onto the strip of cloth with thin paste. Then fold back the overhanging half of the strip of cloth flush with the *shunao* edge of the fascicle. Cut out two pieces of cardboard the same size as the book; the thickness of the cardboard should be determined by the size and thick-

ness of the fascicles. Rub the edges of the cardboard smooth with sandpaper. Apply some thick paste to the strip of cloth, and stick the cardboard onto it in line with the *shunao* edge of the fascicle. Apply some thick paste along the *shunao* edge of the fascicle, and stick a strip of paper onto it. Cut upper and lower covers out of a single sheet of paper so that they are joined together, a centimeter and a half bigger in all dimensions than the fascicle. When the *shunao* edge has dried, paste it again with thick paste, leaving five centimeters unpasted at either end; then fold the cover in half and stick it onto the *shunao* edge. With a pair of scissors, cut two slits in the cover paper where it overhangs the *shunao* edge at the head and tail and paste it on both sides (figure 51); fold this section in and

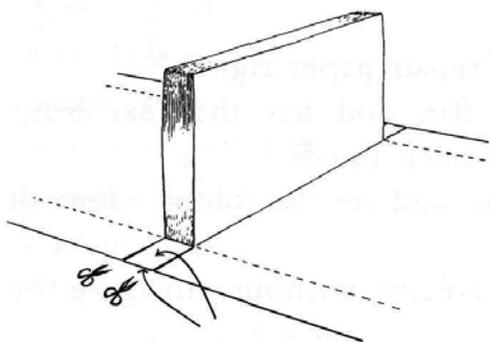


FIGURE 51

stick it onto the *shunao* edge of the fascicle. Then apply some thick paste all over both upper and lower boards, and smooth the cover down onto them with a *zongshua*. Turn in the overhanging edges of the cover and paste them to the boards, cutting away the double thickness at the corners with a pair of scissors. When the paste has dried, stick a sheet of lining paper, slightly smaller than the boards, onto

the inner face of each board. Lay sheets of blotting paper above and below the boards, place the fascicle between pressing boards, and weight it down with a stone or some other heavy object.

Leave it for several days, until the paste has completely dried, before removing the stone, pressing boards, and sheets of blotting paper. (Figure 52 is a diagram of this rather complicated structure.)

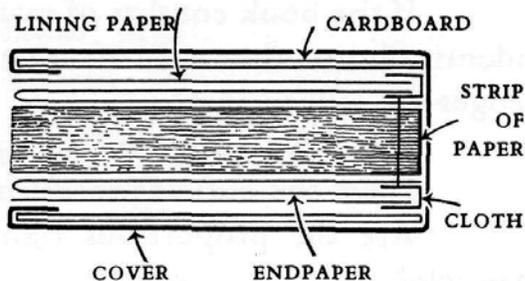


FIGURE 52

• Points to Note

With the hard wrapped-back binding, the *shunao* edge of each fascicle must be trimmed absolutely straight. If not, when the binding is finished and the cover and leaves are opened, they will not lie flat, making the book awkward to read.

When you paste the cover, you should work very quickly, and weight it down with the stone the moment you have finished. Otherwise, on being pasted the cardboard will expand and will contract again on drying, so that it will not be exactly the same size as the leaves, nor will it lie flat.

SOME CONCLUDING OBSERVATIONS

Here are some of the questions that should be asked when a piece of restoration work has been completed, to set the standards by which it should be judged.

Has the paste been used properly, and was it of the right consistency?

Are the color and thickness of the repair paper right?

Are the repaired leaves perfectly flat, and has the text been damaged on any decayed leaves that have been lined?

Have the leaves been folded straight, and are the folded edges all in line at the *shukou*?

Has the beating down been done correctly, without damaging the *shukou*?

Have the text frames been properly aligned, and are the fascicles perfectly level at the *shukou*?

Have the fascicles been trimmed straight, without damaging the text?

If the book consists of many fascicles, have they all been trimmed identically, so that even if some of them are turned upside down, the edges are still in line?

Has the sanding left any greasiness or roughness on the edges?

Have the corner protectors been fitted tightly, with no hollows?

Are the proportions right, and are they all the same on each fascicle?

If fully folded covers have been fitted, have all four edges been folded in straight?

Have the binding holes been pierced straight, or do they slant?

Is the thread the right color and thickness? Do the threads cross?

If a "jade set in gold" binding has been constructed, are the fascicles perfectly level, and are they even at the *shukou*?

If a wrapped-back binding has been constructed, has the cover been pasted on tightly, and is it flat?

If a butterfly binding has been constructed, has the paste been used correctly, and can the leaves be turned at the *shukou* without causing the fascicle to fall apart?

GLOSSARY

- | | |
|------------------------------|----------------------------------|
| Anhui 安徽 | Guangxi 廣西 |
| Anyang 安陽 | <i>Guben xiqu congkan</i> 古本戲曲叢刊 |
| baiji 白芨 | Guizhou 貴州 |
| banxin 版心 | <i>guse shupizhi</i> 古色書皮紙 |
| baobeizhuang 包背裝 | han 函 |
| biao 裱 | Henan 河南 |
| Cai Lun 蔡倫 | hongcha 紅茶 |
| ce 冊 | Hu Yuecong 胡曰從 |
| <i>Cefu yuangui</i> 冊府元龜 | huai 槐 |
| Chongzhen 崇禎 | Huang Peilie 黃丕烈 |
| <i>ciqing shupizhi</i> 瓷青書皮紙 | huangbo 黃蘗 |
| congshu 叢書 | huaqing 化青 |
| danxuanzhi 單宣紙 | hudiezhuang 蝴蝶裝 |
| Ding Yu 丁瑜 | huimo 徽墨 |
| dizhou 地軸 | Huizhou 徽州 |
| Du Weisheng 杜偉生 | hupizhi 虎皮紙 |
| Dunhuang 敦煌 | hushou 護首 |
| <i>Ershisi xiao</i> 二十四孝 | jiaban 夾板 |
| fanjiazhuang 梵夾裝 | Jiajiang 夾江 |
| fenlian zhi 粉連紙 | Jiajing 嘉靖 |
| Fujian 福建 | jialianzhi 加連紙 |
| gonghua 拱花 | Jiangle 將樂 |
| guangjiao 廣膠 | Jiangxi 江西 |

- Jiaqing 嘉慶
 jiaxuanzhi 夾宣紙
 Jieziyuan huazhuan 芥子園畫傳
 Jingxian 涇縣
 jinxiangyu 金鑲玉
 juanzhou 卷軸
 Kaihua 開化
 kaihuazhi 開化紙
 Kangxi 康熙
 ku ciqing 庫瓷青
 ku ciqing zhi 庫瓷青紙
 lajian 蠟箋
 Li Ciming 李慈銘
 Li Wentian 李文田
 lianshizhi 連史紙
 Liulichang 琉璃廠
 luowenzhi 羅文紙
 Luoxuan biangu jianpu 蘿軒變古箋譜
 Mao Jin 毛晉
 maobianzhi 毛邊紙
 maotaizhi 毛泰紙
 maozhuang 毛裝
 mazhi 麻紙
 meipi 眉批
 mianlian zhi 棉連紙
 mianzhi 棉紙
 Min Qiji 閔齊伋
 Mingshi 明史
 muxia 木匣
 Neige Daku 內閣大庫
 nianzizhuang 捻子裝
 Ningbo 寧波
 paibi 排筆
 pizhi 皮紙
 Qianlong 乾隆
 Sanguozhi yanyi 三國志演義
 Shangwu Yinshuguan 商務印書館
 Shizhuzhai jianpu 十竹齋箋譜
 Shuzhuzhai shuhua pu 十竹齋書畫譜
 shubei 書背
 shukou 書口
 Shumu wenxian chubanshe 書目文獻出版社
 shunao 書腦
 shupin 書品
 Sibucongkan 四部叢刊
 Sichuan 四川
 Taihe 泰和
 tanshupi 檀樹皮
 tao 套
 tenghuang 藤黃
 Tianlu Linlang 天祿琳瑯
 Tianyige 天一閣
 tianzhou 天軸
 Tongzhi 同治
 Wangfujing 王府井
 Wanli 萬曆
 Wenyuan yinghua 文苑英華
 Wuxing 吳興
 Wuyingdian 武英殿
 Wuyingdian juzhenban shu 武英殿聚珍版書
 Xianfeng 咸豐
 Xiang Da 向達
 xiangdou 橡斗
 xiangwanzi 橡碗子

xianzhuang 綫裝

Xiao Zhentang 肖振堂

Xuancheng 宣城

xuanzhi 宣紙

Xuanzhou 宣州

Yongle dadian 永樂大典

Yuemantang 越縵堂

yuwei 魚尾

Zhang Yaohua 張耀華

Zhao Jiafu 趙家福

Zhejiang 浙江

Zhengtong Daozang 正統道藏

zheshi 赭石

zhezhuang 摺裝

zhi 紙

zhizi 梔子

Zhongguo guji zhuangding xiubu jishu 中國

古籍裝訂修補技術

Zhonghua shuju 中華書局

zhuzhi 竹紙

Zizhuyuan 紫竹院

zongshua 棕刷