THE ARCHAEOLOGY OF MEDIEVAL BOOKBINDING

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Contents

Preface and acknowledgements

This book evolved from a series of lectures on the archaeology of bookbinding, that I gave as Visiting Professor on behalf of the Dr P.A. Thiele Stichting, at the University of Amsterdam during the winter term of 1987. I light-heartedly accepted the assignment, assuming that it would be easy to fill the many gaps in my knowledge by consulting the big handbooks, which I expected to find in Amsterdam University Library, renowned for its rich collections in the field of book sciences. The shock came when I found that the handbooks weren't there, for the simple reason that they did not exist. Except for Middleton's (1963) book devoted to English bookbinding techniques of mainly the postmedieval period, we have no comprehensive work on medieval bindings. It was indeed a shock to be faced with a virtual absence of information about the book's physical structure which is so fundamental for its function, the safeguarding of its integrity and its ultimate survival.

It seems as if binding structures shared the fate of many utilitarian objects of a protective nature: on becoming worn out and damaged after fulfilling their function they landed on the rubbish heap, just like rundown shoes and ragged clothing. Of no interest to their contemporaries, such objects eventually, after long centuries, became the concern of archaeologists. Many bindings, however, have been lost through rebinding, not because of wear and tear but because they failed to accord with the taste of the times and their owners, or clashed with a style of furniture. Since the Renaissance, this practice has been observed by countless book collectors and bibliophiles and has resulted in the annihilation of thousands of medieval bindings. Neglect and ruthless restorations have also caused considerable losses, leaving us today with no more than one to five per cent of original bindings on the surviving medieval books – an inestimable loss for the history of the book.

Ironically, the aesthetic aspects of bookbindings inspired the earliest attempts to cast a scholarly eye on them: their decoration was the subject of the first studies such as those of Weale (1894–8) in England and Schwenke (1898) in Germany, to be followed by a great number of scholars for a century to come. Focusing attention on the embellishment of the covers, with rubbings of the stamped decoration as the basic working tool and instrument to identify bindings and their origins, a new branch of book research was created for which *Einbandkunde* seemed to be the proper term. Yet the term – without appropriate equivalents in other languages – disguised the fact that it merely covered the history of the costume of the book, its outward appearance, utterly neglecting the internal structure. Perusal of the literature, be it concise like Breslauer's (1986) overview with 195 references or the almost complete bibliography of Schmidt-Künsemüller (1987) with 8000 entries, reveals that no more than 10 per cent is concerned with binding techniques and binding structures.

Whereas the majority of scholars of previous generations avoided the structural aspects, exceptions must be acknowledged: Theodor Gottlieb (1869–1929), Ernst Philip Goldschmidt (1887–1954), Theodore C. Petersen (1883–1966) and Graham Pollard (1903–1976) are among those who were eager to uncover technical details hidden under the outer lustre, admittedly an arduous task for the uninitiated in the craft. For craftsmen, examination of their own past had been easier, and we owe gratitude for the wealth of observations recorded by binders like Paul Adam (1849–1931) and Berthe van Regemorter (1879–1964). But even they sometimes lost their footing on the slippery road and could not avoid fallacies. As pioneers are torchbearers, they themselves are easily blinded; yet their achievements deserve to be honoured by careful and critical reassessment of their work rather than by perpetuation of their mistakes in blind admiration of their authority. Misconceptions of the past tend to persist especially when progress is slow, as indeed it has been: Weale (1894–8) used 38 pages of a total of 484 (8 per cent) for a concise, lucidly illustrated and essentially still valid technical introduction; one hundred years later, a recent *Einbandkunde* (Mazal 1997) of 516 pages offers the reader 30 pages (5.8 per cent) on the techniques of binding and decoration, most of it rehashed biases and downright falsehoods, with hardly any basic information.

It is high time that we, leaving behind us and forgiving the errors and shortcomings of our predecessors, focus critical attention on what should be undertaken today to make up for past negligence. First of all, we must make sure not to lose those very few objects left which we so badly need for our research. We must, however late, at last respond to warnings we failed to take seriously, like Wattenbach's (1871 p. 231): '*Es ist immer eine grosse Barbarei, wenn man, wie das besonders in früher Zeit häufig geschehen ist, ohne Noth die ursprünglichen Einbände zerstört*', or as expressed by Goldschmidt (1928 p. 123): 'Our knowledge [. . .] is far too limited to permit us to judge what essential data we may be destroying when we allow an old book to be handed over to a binder "to be restored". There is no such thing as restoring an old binding without obliterating its entire history'. It is satisfying that there are some signs of progress: the disdain for bookbinding as a subject unworthy of any scientific interest is gradually decreasing, and codicologists and bibliographers are beginning to appreciate that the physical evidence associated with binding structures contains irreplaceable information (Foot 1993; Budny 1994). Book restorers and conservators likewise are starting to perceive that old binding structures are a rich source of knowledge and insight, and a dependable guide in dealing with the aged objects entrusted to their care. Here a great deal of credit must go to Roger Powell (1896–1990), only recently honoured with a posthumous Festschrift (see Sharpe 1996b); his respectful approach in dealing with those fragile ancient manuscripts has become the inspiration to a new generation of learned conservators, among them Christopher Clarkson and Nicholas Pickwoad.

Growing concern with preservation of medieval bindings is attested by undertakings such as the census initiated in the early 1980s by the Istituto centrale per la patologia del libro in Rome, an ambitious project still in process (Federici 1986; 1990–91; 1993; 1997; Federici and Pascalicchio 1993, Storace and Munafò 1996); similar projects, of a slightly smaller scope, are under way in England (Sheppard 1989; 1990) and in France

(Vezin 1990; Grosdidier de Matons, Hoffmann and Vezin 1993). A project of cataloguing bindings in major French libraries is an outcome of this interest; its first volume (Alexandre and Maître 1998, describing the medieval bindings of Autun Bibliothèque municipale) was published too late to be dealt with in this book. In Germany, where an ambitious proposal to register historic bindings was made in the late 1920s but never carried out, a new effort has been taking shape in recent years which envisages a census encompassing both decorative and structural aspects (Ottermann 1997). Positive as such endeavours seem in the era of the electronic media, one must hope that they will not disturb the peace so beneficial to those tender veterans. Having seen a considerable number of carolingian bindings still in pristine condition mainly because they have been left alone for a millennium, but having witnessed that in my lifetime the Domesday Book has twice gone through the ordeal of a complete rebinding, I must confess a lack of wisdom as to the optimal way to gather knowledge without causing damage to these precious archaeological objects.

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This book attempts to trace the evolution of the physical structure of the book in codex form, from its invention in the early centuries of our era to the end of the sixteenth century, a period I have arbitrarily designated as medieval. The subdivision into ten chapters follows a pattern of typological entities, defined on the basis of occurrence of a set of physical characteristics, partly confined within geographical and chronological boundaries. The chapters are based on the available literature, from which the major part of the data on binding structures is derived. My own studies encompass no more than about one thousand bindings, an exceedingly small number, further biased by the fact that the majority originates in Central and Western Europe; England is represented by a minute sample, Southern Europe hardly at all. Collected within the last ten years, the presentation of such limited results can only be excused by the fact that more than one human lifetime would be required to complete such an undertaking. I am keenly aware of the shortcomings of my work, bound to be provisional and incomplete in view of the lack of adequate primary research; I have decided to publish this imperfect study simply because otherwise the few building blocks I have gathered would be buried, and future scholars denied the opportunity to correct my mistakes.

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This book could not have been written without firsthand experience with the binder's craft. I owe my professional training in bookbinding, beginning in 1971, to Martin Jaegle of the Centro del bel libro in Ascona, who answered many of my queries but often failed to do so; I am especially indebted for the latter, since it planted the seed of a 25-year quest for the reasons why bookbinders did what they did. I gathered the courage to undertake the writing of this book while lecturing on the subject at the University of Amsterdam, an adventure aided by warm support of Professor Ernst Braches, Ton Croiset van Uchelen and Kees Gnirrep of the Amsterdam University Library; the privileged visits to its stacks helped me to devise a methodology for studying binding structures. A unique exercise and perfect training was the work on a Dutch terminology for describing old bindings, undertaken in

collaboration with Professor Peter Gumbert and Kees Gnirrep (Gnirrep, Gumbert and Szirmai 1992). It taught me that terminological clarity is a prerequisite for precise recording of observations of binding structures; the lack of an established and uniform English terminology prevented me from achieving the precision I would have desired. The absence of a glossary in this highly technical text is deliberate: glossaries are bound to remain, despite brave intentions and much effort, subjective lists of a given author's preferences, witness the recent compilation by Greenfield (1998). What is really needed is a systematic vocabulary, which can only be worked out and agreed upon by a team of specialists. This book can do no more than to demonstrate the urgent need for a generally accepted uniform terminology and to provide some basic building blocks.

In addition to the resources of the Amsterdam University Library, I gathered the core of the material for this book between 1989 and 1993 at the St Gall Stiftsbibliothek, where Professor Peter Ochsenbein granted me the privilege of examining the treasure of several hundreds of original medieval bindings. I also owe thanks to the Stichting Librije Walburgskerk in Zutphen, where, acting as adviser between 1989 and 1996 for the restoration project, I collected a wealth of data on the fifteenth- and sixteenth-century bindings of this unique chained library. I was given generous access to study material in the collections of many other institutions. These are: Amsterdam, Bibliotheca Philosophica Hermetica; Basle, Universitätsbibliothek; Berlin, Staatsbibliothek Preussischer Kulturbesitz; Budapest, Országos Széchényi Könyvtár; Cambridge, University Library; Deventer, Athenaeumbibliotheek; Düsseldorf, Kunstmuseum; Graz, Universitätsbibliothek; Hereford, Cathedral Library; Karlsruhe, Badische Landesbibliothek; Leiden, Bibliotheek der Rijksuniversiteit; London, The British Library, Victoria and Albert Museum; Munich, Bayerische Staatsbibliothek; New York, The Pierpont Morgan Library; Nijmegen, Universiteitsbibliotheek; Oxford, Bodleian Library; Schaffhausen, Stadtbibliothek; Shrewsbury, The School Library; The Hague, Koninklijke Bibliotheek, Museum Meermanno-Westreenianum; Tübingen, Universitätsbibliothek; Utrecht, Universiteitsbibliotheek; Vienna, Österreichische Nationalbibliothek; Wolfenbüttel, Herzog August Bibliothek; Zurich, Zentralbibliothek and Zutphen, Gemeentearchief.

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J.A. Szirmai
NL Oosterbeek, March 1998

Abbreviations

Dates are abbreviated by the convention s. (*saeculum*) and a roman numeral for the century, followed by in., med., or ex. in superscript, indicating the beginning, middle or the end of a century, or by superscript numbers 1 or 2 for the first or second half, transition between two centuries is indicated by an oblique stroke; for example, s. xiii^{n}, s. xii^{2}, s.xi/xii.

Statistical symbols used are r (correlation coefficient), *s.d.* (standard deviation), χ refers to the chi-square test for independence (Harnett 1982 pp. 708 ff.); values of χ above 3.84 were considered significant at $\alpha = 0.05$.

Institutions are abbreviated as follows:

AB	Athenaeumbibliotheek, Deventer
BA	Biblioteca Ambrosiana, Milan
BG	Bibliothèque générale
BL	British Library, London
BLB	Badische Landesbibliothek, Karlsruhe
BM	Bibliothèque municipale
BN	Biblioteca Nacional, Bibliothèque nationale, Biblioteca Nazionale
BNF	Bibliothèque nationale de France, Paris
Bodley	Bodleian Library, Oxford
Bodmer	Bibliotheca Bodmeriana, Geneva
BR	Bibliothèque Royale, Brussels
BSB	Bayerische Staatsbibliothek, Munich
CL	Cathedral Library
GA	Gemeente Archief
GHB	Gesamthochschulbibliothek, Kassel
GNM	Germanisches Nationalmuseum, Nuremberg
HAB	Herzog August Bibliothek, Wolfenbüttel
HLB	Hessische Landesbibliothek, Fulda
HLHB	Hessische Landes- und Hochschulbibliothek, Darmstadt
KB	Kongelige Bibliotek, Koninklijke Bibliotheek
KM	Kunstmuseum
LB	Landesbibliothek
Libr.	Librije St Walburgskerk, Zutphen
MCC	Museum Het Catharijneconvent, Utrecht
MMW	Museum Meermanno-Westreenianum, The Hague
ÖNB	Österreichische Nationalbibliothek, Vienna
OSzK	Országos Széchényi Könyvtár, Budapest

PML	Pierpont Morgan Library, New York
PRO	Public Record Office, London
RMO	Rijksmuseum voor Oudheden, Leiden
SB	Stadtbibliothek
SBB	Staatsbibliothek zu Berlin
SBPK	Staatsbibliothek Preussischer Kulturbesitz, Berlin
StB	Staatsbibliothek
StfB	Stiftsbibliothek
UB	Universitätsbibliothek, Universiteitsbibliotheek
UL	University Library
ULB	Universitäts- und Landesbibliothek
V&A	Victoria and Albert Museum Library, London
Vat.	Bibliotheca Apostolica Vaticana, Vatican City
WAB	Wissenschaftliche Allgemeinbibliothek, Erfurt
WAG	Walters Art Gallery, Baltimore
ZB	Zentralbibliothek, Zurich

Part I The Mediterranean heritage

Introduction

The appearance of the codex can be traced to the first centuries of Christianity. Only indirect evidence points to its still earlier existence during the Hittite empire. Reliefs on stelae dating from the eighth century BC, excavated in Marash (south-east Turkey), depict codex-like objects with lines along the spine which resemble the board attachment of Coptic and Byzantine codices. Together with the images of a brush and double inkwell these representations are highly suggestive but still have to remain conjectural until archaeological evidence proves their former existence.[1]

Archaeological finds support the assumption that the codex first began to replace the scroll in the eastern part of the Mediterranean basin. The codex seems to have been the preferred book form of the new religion. While 83 per cent of 290 Christian texts dating from the first four centuries were already bound in codex form, 88 per cent of 2435 Greek literary texts from the same period retained the traditional roll form.[2] However, the evidence from the several hundred early fragments that have come down to us, badly damaged due to the ravages of time and natural deterioration of organic materials, is limited almost exclusively to conclusions about the format and not the physical structure of the codex. But perhaps even more has been lost by the neglect and disinterest of scholars of previous generations, who were principally concerned with the texts. This neglect of the physical aspects of the construction of the codex is reflected in recent studies on the subject. E.G. Turner in *The Typology of the Early Codex* (1977 pp. XXI–XXII) acknowledges that he has 'nothing to say on the subject of bindings, and that is a weakness'; in another eminent work, *The Birth of the Codex* by C.H. Roberts and T.C. Skeat (1983), not a single line is devoted to binding structures.

Much ink has been spilt to little profit over the idea, promulgated for more than a century, that the codex was modelled on the example of writing tablets. Since this idea was first introduced by Wattenbach (1871 p. 111), it has been reiterated by countless authors; authorities continue to assure us that 'there has never been any doubt about the physical origin of the codex, namely that it was developed from the wooden writing tablet' (Roberts and Skeat 1983 p. 1). Tablets of wood or other materials, with or without wax on the writing surface and joined in sets of two, three or more, have been used for recording notes, accounts, school exercises and various ephemera, from the Middle East to Britain and from Egypt to Scandinavia and northern Russia, and from the Bronze Age up to the nineteenth century. Even if there is evidence that whole literary texts have been recorded on wooden polypticha (Sharpe 1996b), the crude methods of connecting the rigid elements of a set of tablets (using hinges, metal rings or lacings) have nothing in common with the structures employed to join leaves of a codex. The derivation of the codex from the writing tablet is a

surmise *e silentio*: for too long its validity has been taken for granted without scrutiny of the exact nature of the relationship (Kretz [1956]; Szirmai 1990b).[3]

There is another persistent tradition that the codex evolved from the parchment notebook of the ancient Romans (*pugillares membranei*). However, this contention has hardly any archaeological support: the evidence is entirely literary, based on texts of classical authors like Martial (AD 40–104), whose eloquent praise of the advantages of the new book form over the roll provided fertile ground for speculation.[4]

In the following chapters, physical evidence will be the guide to track the evolution and the spread of the early codex throughout the literate world of that age, which was, in fact, the world of Eastern Christianity. The Coptic Church seems to have been the cradle of the single-quire (Chapter 1) and multi-quire codex (Chapters 2 and 3), which were later nurtured in the first coenobitic monasteries; it is the Egyptian sand that preserved the earliest physical evidence. Probably the Coptic Church had brought the new religion to Nubia and Ethiopia, the latter becoming isolated for a millennium and keeping the ancient codex form virtually unchanged (Chapter 4).

With Constantine's inauguration of Constantinople as the new capital of the Roman Empire in AD 330, Christianity gradually established itself as the official religion of a realm comprising the east Balkans and Asia Minor. In the sixth century, under the patriarchs of Rome, Constantinople, Alexandria, Antioch and Jerusalem, when Christianity had become more organized, it was at the same time troubled by theological controversies. These led to dissent and alienation of the Monophysite Churches of Egypt, Syria, Armenia and the Church of the Nestorians. The missionaries of these churches took Christianity, and with it its book form, deep into Asia.[5] The Manicheans, too, had adopted the codex and likewise, though earlier, carried it with them into Turkestan and Central Asia.[6] Christianity radiated from Byzantium and also spread to the West and North into the Slavic world: Saints Cyril and Methodius attempted to bring it to Moravia in the ninth century; Russia was christianized in the ninth/tenth century and became the stronghold of the Orthodox Church after the Fall of Constantinople to the Turks in 1453. This fatal event seems to have been the cause of a general exodus of Byzantine scholarship to the West; oriental craftsmen from Greece and the Near East migrated to Italy and brought with them the Byzantine codex which the Western binder eventually moulded into the 'alla greca' binding. This clearly demonstrates the influence of the Mediterranean heritage on the Western binding tradition.

The Fall of Constantinople was the end of the Byzantine Empire, but its decline began much earlier: in the seventh century Alexandria and Antioch fell into Moslem hands, and in the next hundred years Islam conquered North Africa and Spain and gradually occupied Asia Minor and the Balkans. Islam, the second largest religion emanating from the Mediterranean cultural basin, naturally adopted the codex as its book form (Chapter 5); the Arabic bookbinder introduced pasteboard, replacing the heavy wooden board, the principle of case binding and perfected decoration techniques like gold tooling. These innovations eventually reached the Western world, most probably through Spain and Italy, and significantly influenced Western binding techniques.

But what about the codex form in another significant – and even more ancient –

religious realm, that of the Jewish world, centred in the birthplace of the first codex? As no early codices of Hebrew manuscripts seem to have survived, it remains unclear when this book form was adopted. The earliest papyrus fragments, which might have come from codices, date from the fourth century; the earliest Hebrew biblical codices are ascribed to the eighth or ninth century (Diringer 1953 pp. 321–26), but have lost their original bindings. This scarcity has different causes: although the scroll was the obligatory form for many Jewish religious texts (as it still is today), there is no doubt that the codex played its role in its own right. Obviously, two millennia of zealotry and continuing efforts to annihilate Jewish literature have resulted in irretrievable losses. Yet, Jewish communities themselves had the practice of withdrawing defective manuscripts from circulation by depositing them in the 'Geniza' in the synagogue, to have them buried later in a religious ceremony (Diringer 1953 p. 326; Deuel 1966 pp. 351–81). These storehouses turned out to be real treasure troves of early manuscripts and binding fragments, as in the case of the famous Cairo Geniza. It is highly regrettable that virtually no effort has been made so far to explore this rich source of early binding structures.

Literary sources appear to provide evidence for the use of the codex by the ancient Jewish sect of the Samaritans, possibly as early as the third or fourth century AD. The fact that some of their scripts have their roots in Egypt would lend itself to explaining the link-stitch sewing, described by Crown (1987), on a series of extant Samaritan codices, dating from the thirteenth century at the earliest. They show signs of intensive use and of many old and new repairs, yet allow us to establish that, since they present features of Coptic and Byzantine codices, they conformed to the Mediterranean binding tradition.[7] However, they represent such a small and perhaps hardly representative sample that the chapter on the early Jewish codex cannot yet be written.

NOTES

1. The suggestion that these objects represent ancient codex structures was first made by van Regemorter (1958b); see also Szirmai (1990b). Others, like Skeat (1969 p. 66) and Roberts and Skeat (1983 p. 11), interpret them as wooden or ivory tablets.
2. Calculated from the data of Roberts and Skeat (1983 pp. 37–44). In their chapter 9 possible reasons for the Christians' preference for the codex are discussed in detail; see also Turner (1968), Skeat (1969), McCormick (1985) and van Haelst (1989).
3. For recent data on writing tablets see Lalou (1989; 1992), Sharpe (1992; 1996b) and Brown (1994); a review of the material aspects is given by Büll (1968).
4. Relevant sources of the classical authors are given by Kenyon (1932). For a reappraisal see Roberts and Skeat (1983) and van Haelst (1989).
5. In its heyday between AD 700 and 1000 the Nestorian Church stretched from Syria to China and must have had millions of adherents. With the persecution and subsequent annihilation of their communities the vast majority of their scripts was destroyed. A unique Nestorian codex dated AD 892 is documented and illustrated by Diringer (1953 pp. 296–301); it was written by a missionary returning from China and found after his death in his cave in the Hakkari Mountains (Kurdistan), where a few small communities of Nestorians still live in isolation (Chevalier 1985).
6. The Manicheans are credited with great care in writing and illuminating manuscripts and lavishly embellishing their bindings (Diringer 1953 pp. 341–43). Subject to persecution by the Christian Church and Islam, little is left of what once had been a high standard of bookmaking. A few of their manuscripts with fragments of

decorated book covers have been found near Turfân (Turkistan) early this century; they are ascribed to the eighth or ninth century (Le Coq 1923 pl. 17e; Loubier 1926 fig. 106; Klimkeit 1982 fig. 56).

7. The earliest report on Samaritan codices appeared in an article by the Near East traveller, Mary Eliza Rogers, in 1868; her illustrations were reproduced in an anonymous review in *The British Bookmaker* in 1890. Paul Adam had planned to include this drawing in his unfinished manuscript of his *Geschichte der Einbandkunst* (*c.* 1930, kept in the Düsseldorf Kunstmuseum); he interpreted the thin wooden plates, which were sewn onto the head and tail of the spine, as evidence of repair to straighten the deformed bookblock and consolidate its flat shape. The suggestions that the wooden plates are parts of the bookblock sewing (Génévois 1974) or of the endband structure (Crown 1987) are unlikely. I owe thanks to Fred Shihadeh, who examined for me the Samaritan manuscript Philadelphia Haverford College MS 22 and confirmed that vestiges of an endband of coloured thread are independent of the wooden plate, and to Bernard C. Middleton for tracking down the reference of Rogers' article.

Chapter 1 The first single-quire Coptic codices

1.1 INTRODUCTION

Although leaves or fragments of leaves of the earliest codices can be traced back to the second century AD, the first surviving binding structures seem to date only from the third/fourth century AD. The best-known examples are the Gnostic manuscripts found in 1945, buried in a jar near the Egyptian village of Nag Hammadi, close to the ancient monastery of Chenoboskion, and comprising 13 papyrus codices (all but one of the single-quire type) still in their original leather binding. The important find was announced by Jean Doresse and Togo Mina in 1949 but despite the considerable attention they have received since then, a whole decade passed before they were made accessible to scholars, and another two before the results were finally published: a true odyssey inflicting more damage to the objects than had the ravages of time. For the history of the find see Robinson (1984 pp. 3–14; 1991).

The first publication by Doresse and Mina (1949) contained only a photograph of the bindings (Figure 1.1) and the plain statement that the volumes 'conservent leur reliure de cuir en excellent état'. Van Regemorter (1955; 1960) was allowed to examine five bindings, evidently under very hasty conditions; her report is deficient and has been superseded by a later and concise article by Doresse (1961) presenting his first original sketches and photographs. Unfortunately, Doresse's hope that soon '*une étude précise de leurs reliures pourrait être enterprise par quelque spécialiste plus compétent que nous-même*' (p. 27) as well as his fears that, with all that delay, he '*ne trouvera vraisamblablement plus devant lui que des codices restaurés sans que les observations techniques indispensables aient été faites en leur temps*' (p. 30) became true. From the description of the bindings by Robinson in the *Facsimile Edition of the Nag Hammadi Codices* (1972–7) it appears that some parts had already been lost by then or were no longer in their original state; as the bindings had been dismantled without thorough documentation, some aspects could not be clarified.

1.2 THE COVERS OF THE NAG HAMMADI CODICES

The bindings of the Nag Hammadi codices are apparently very simple, but due to the above circumstances some details remain obscure. Their construction (Figure 1.2) is described on the basis of the information given in the *Facsimile Edition* (1972–7) and in two summaries by Robinson (1975; 1984 pp. 71–86);[1] further particulars are also found in Krause and Lahib (1962), Krause (1975), Ogden (1989) and Marshall (1993).[2]

Figure 1.1 The Nag Hammadi codices in their original state shortly after their discovery in 1945 (from Doresse and Mina 1949).

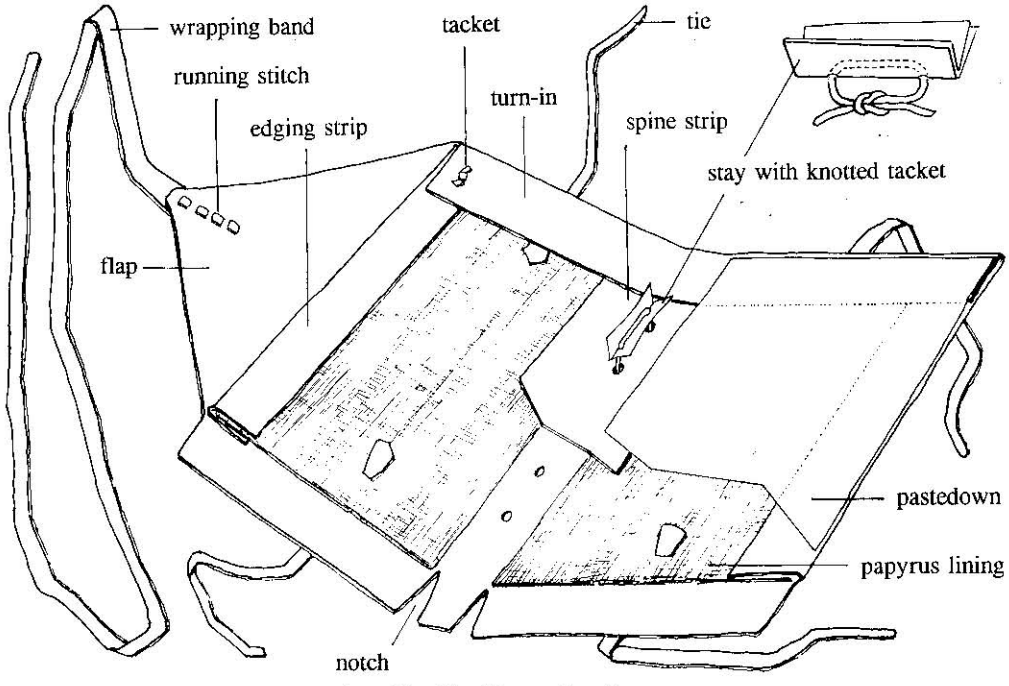

Figure 1.2 Diagram of the construction of the Nag Hammadi codices.

The basic principle of the Nag Hammadi bindings is that of a limp leather covering, stiffened to a varying degree by a lining of reused papyrus, joined with the quire by two knotted tackets passing through the centrefold. In most cases the front edge of the upper cover extends to a flap,[3] to which a wrapping band of leather is attached; additionally, pairs of leather ties at the head and tail of either cover are applied to keep the book closed. A whole hide (goat- or sheepskin)[4] was required to cover the codices (height 240 to 290 mm, width 120 to 180 mm), the neck portion often being utilized for the envelope flap. In some cases (Codices V, VII, IX and XI)[5] the covering is composed of several pieces, their slightly overlapping edges joined together by a running stitch with lacing. The skin has been cut large enough to allow for turn-ins of 20 to 40 mm; on bindings with an envelope flap an extra edging strip of leather is provided.

The envelope flap is of triangular (Codices II, III, V, VII and XI) or rectangular (Codices VI, IX and X) shape; Codices IV and VIII have no such flap and the front edge of the upper cover is turned in as usual. The edges of the leather are neatly cut; the turn-ins are fully overlapping at the corners, the head and tail turn-ins being on the top in Codices IV, VII and VIII, the front turn-in on the top in Codices II, III, V, VI, IX and X. However, these data should be treated with reservations: since the papyrus lining was removed from all the covers, the original position of the turn-ins has become uncertain. The head and tail turn-ins of Codices IV, V and VIII extend over the spine area; in the others, notches have been cut into the turn-ins at the spine area, hence allowing for freer movement of the covers (see Figure 1.2). The turn-ins seem to have been pasted down; in some cases (Codices II, IV, IX and X) they are further secured with tiny tackets of leather, with single knots on the inner face of the covers.

A wrapping band of leather is fastened to the envelope flap with a tacket or a running stitch, sometimes employing decorative reinforcement with patches of leather (Codices III and VII). Most of the wrapping bands are broken or incomplete, but those which could be reconstructed measured 540, 580, 715 and 1030 mm (Codices IX, VI, VII and IV respectively, the latter consisting of two pieces). Leather ties are affixed to the head and tail of both covers; in most cases the ties are threaded through a slit in the cover and their slightly widened ends pasted down onto the already lined inner face of the cover. In Codex II the ties are secured by a short leather strip going across their base; Codex III seems to have a self-anchoring attachment through three slits, similar to the attachment of leather ties on late medieval European limp bindings (see Figure 10.27). Codex XI has neither ties nor a wrapping band. While the covers of Codices IV, V and VIII are decorated with blind-tooled lines, Codex II is tooled more elaborately with ornamental figures between the lines, possibly inked or coloured.

All covers (except for those of Codex II) have a papyrus lining of an unspecified number of used leaves (but blank in Codex VI), in most cases carrying Coptic or Greek texts which provide evidence for dating the bindings to the second half of the fourth century AD (Barns 1975). In some cases (Codices IV, V and VIII) the lining extends over both covers and the back; in Codices VI, IX and X the upper and lower covers are lined individually, thus leaving the back unstiffened. In most cases (except for Codices II and XI) there is usually a protruding strip of leather on the spine (for a definition of the terms 'back' and

'spine' see Chapter 2, note 3). The height of these leather spine strips equals the height of the covers, their overall width ranging from 40 to 110 mm. Their extensions are pasted down either directly on the inner face of the leather covering or on the papyrus lining, occasionally sandwiched in-between papyrus layers; on the inner face of the covering the turn-ins are folded over the extensions of the spine strips. Codices IX and X have, in addition, leather strips taken across the spine strip and covered by the turn-ins at the head and tail. Usually blank papyrus leaves are pasted down on the inner face of the covers and over the turn-ins. In some cases the first and last leaves of the quire remain uninscribed, possibly meant as flyleaves.

1.3 COVER ATTACHMENT

Quire and cover were connected by means of two leather tackets: rolled leather thongs, traversing the quire in the centrefold through a pair of holes c. 20 to 45 mm apart.[6] In Codex II 'vestiges of flax string survive' (Robinson 1975 p. 180). Stays (short inner guards) of pieces of leather were placed inside the centrefold to prevent the leaves from tearing (found still *in situ* in Codices IV, V, VI and IX). The tackets passed through the back covering and were knotted either on the back, as in Codices II, VI, IX, and X, or inside the centrefold as in Codices IV, V and VIII (Figure 1.3 [a]). Since in Codices III and VII there are no holes visible in the back of the covering, it is evident that the spine strip was first tacketed to the quire and then pasted down onto the inner face of the covering. Obviously this method was used on Codex III, as the knotted ends of the tackets have been found to lie between the spine strip and the covering (Figure 1.3 [b]). This method of attachment is more sophisticated: it is perhaps less strong, but aesthetically more pleasing, as the tackets are not visible on the back. For Codex VII this cannot be verified likewise, since the spine strip has not survived and no details of the attachment been recorded.

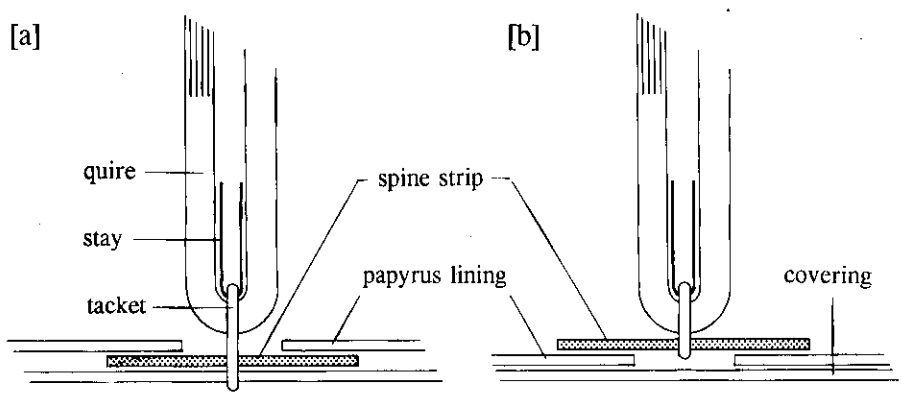

Figure 1.3 Two methods of cover attachment observed on the Nag Hammadi codices: [a], direct attachment with the tacket passing through the whole of the cover; [b], attachment mediated through the spine strip, the tacket passing through the spine strip only and remaining hidden under the covering.

1.4 TYPOLOGY OF THE NAG HAMMADI CODICES

On the basis of different traits in the technical details of the bindings Doresse (1961 p. 49), Krause (1975) and Robinson (1975 pp. 184–90; 1984 pp. 79–86) have attempted to classify the codices into groups. The codices of one group (Codices IV, V and VIII) have a one-piece papyrus lining and no notches in the turn-ins of the back, with a resulting marked stiffness of the binding. The tackets attaching the quire to the cover are knotted in the centrefold. The wrapping band consists of two pieces of thong (in Codex VIII the second part is lost); the leather ties at the head and tail are threaded through the covers and their widened ends pasted down on their inner face. The covering is of a dark brown-grey colour tooled with simple blind lines; only Codex V has an envelope flap. These three codices are the shortest (heights 237, 243 and 242 mm) and the papyrus of the text is relatively coarse.

The second group comprises Codices VI, IX, X and possibly II. Their main features are: a rectangular envelope flap, no papyrus lining on the back and the presence of two horizontal strips of leather between the covering and spine strip in the area of tacketing; the turn-ins are held down by minute tackets with the knots on the inner face of the covers. The tackets connecting the quire to the cover are tied on the back in the case of Codices VI, IX and X. The covering is of a golden tan colour and has no decoration (except for Codex II which is the most ornate one). The papyrus is much finer than that of the previous group.

According to the above authors the remaining Nag Hammadi codices do not share enough common traits to establish another group. Yet Codices III and VII could be grouped together on account of their distinct cover attachment, which, as described above and shown in Figure 1.3 [b], depends solely on adhesive, for the tackets are not passed through the covering. Here, the spine strip plays the role of the flanges, encountered on many types of multi-quire bindings (see Chapter 5, note 9). The two covers with the back are comparable to a separately made 'case', fixed to the bookblock with adhesive.

1.5 OTHER SINGLE-QUIRE CODICES

The Nag Hammadi codices have received considerable attention, although they constitute only a comparatively small proportion of all extant single-quire codices: Turner (1977 pp. 58–60) lists about 45 further examples, 60 per cent of them belonging to the fourth century, 30 per cent to the third century. They all originate from finds in Middle and Upper Egypt and contain literary or other Greek texts and Christian texts in Coptic or Greek. Unfortunately there is little information about their binding structures; the first owners had the codices taken apart and their leaves mounted between glass plates. Seldom has any attention been paid to a binding unless it was decorated, and only rarely have structural details been recorded.

An example of the lack of interest in binding structures is the fate of the Gnostic manuscript P. Berol. 8502, unearthed in pristine condition: '*Das Manuskript lag noch in dem Originaldeckel aus Leder und Papyrus, wie überhaupt das Ganze in einem unversehrten Zustande*

gefunden sein musste' (Schmidt 1896 p. 839). The codex was dismantled and the binding forgotten (illustrated without identification by Adam 1923–4 p. 98). A search initiated by James M. Robinson led to its rediscovery and publication by Krutzsch and Poethke (1984). According to the latter, the detached covers are from an earlier blind-tooled leather codex; their description and notably their photographs indicate that the quire was attached to the covers by means of method [b] in Figure 1.3.

A similar single-quire Coptic codex (Berlin SBB MS or. oct. 987) was dismantled and its contents mounted between glass by Ibscher in the late 1910s. Again no details of the binding structure were recorded, except for mentioning a parchment stay and vestiges of a hempen [?] cord, the lining of the covering with six to eight leaves of reused papyrus, four pairs of leather ties (two at the front edge, one each at the head and tail) and simple blind tooling with triple lines (Ibscher 1920).[7] With reference to one of the codices of the Dublin Chester Beatty Library (unspecified), Ibscher (1937 p. 13) suggested an alternative method of forming a stiff cover by pasting together a number of the uninscribed outer leaves of either side of the quire; this pasteboard formed *in situ* would then be covered with leather.

The Crosby-Schøyen Codex (Schøyen Collection, Oslo and London; see Willis 1961; Goehring 1990), one of the smallest single-quire codices (146 × 152 mm), originally consisted of 68 leaves. When it surfaced in 1955, it still contained a 'narrow back-strip of leather [. . .] which anchored the thick cord with which the quire was sewn'; the cord, still present then, secured the leaves 'with a single vertical loop' (Willis 1961 p. 387).

1.6 THE BOOKBLOCK

All single-quire codices are written on papyrus and can consist of a considerable number of sheets: Turner (1977 pp. 58–60) cites Milan BA MS P. Vogliano V of 70 sheets (140 leaves) as one of the most bulky examples; the Nag Hammadi Codices II, III, VII and VIII with 148, 152, 132 and 140 pages respectively are of medium size, while the Leiden RMO Papyri X and W with 40 and 32 pages respectively being examples of smaller ones. In the case of Berlin SBB MS or. oct. 987 Ibscher showed that its 40 sheets had been serially cut from two papyrus rolls of 3140 and 2920 mm; this has been confirmed in many other cases and seems to have been an established practice in a period when papyrus rolls were in general use (Ibscher 1920 p. 38; see also Turner 1977 p. 44).

When a large number of sheets is folded the inner leaves will markedly protrude at the fore-edge. Actual evidence shows that the fore-edge must have been trimmed, since the central leaves are considerably narrower. For the Nag Hammadi codices, Marshall (1993) noted differences in width between the outer and inner leaves of *c.* 20 mm (ranging from 6 to 30 mm). The outer leaves of the PML Iliad have a width of 140 mm, the inner leaves only of 125 mm; the corresponding values of Berlin P. Berol. 8502 are 135 and 100 mm, the difference in the case of the Dublin Chester Beatty Library Bibl. Pap. II is about 30 mm (Turner 1977 p. 23).

This seems to have been one of the cumbersome aspects of the single-quire codex: the scribe had to adjust the width of the written column according to the available space as

he proceeded through the consecutive pages – it is probable that the codex had to be written after the leaves had been joined. Another problem must have been to calculate accurately in advance the number of pages required: once this was set and the writing had started, there was no simple means to add further leaves, except to insert stubbed leaves (leaves 6, 26 and 37 in Berlin SBB MS or. oct. 987 are examples of such stubbed leaves [Ibscher 1920 p. 38]).

It is not feasible to gain insight into the functioning of the single-quire codex from those brittle and damaged remains which came down to us. But it may be assumed that considerable strain in the folds was inherent to this construction: the use of stays and reinforcing strips on the spine indicates that this weakness had obviously been recognized and this perhaps induced the exploration of other methods of construction, such as the multi-quire codex.

It has been suggested, notably by Ibscher (1920; 1937), that the single-quire codex was the predecessor of the multi-quire codex. This contention is not verified by actual evidence: in fact, already in Ibscher's day enough multi-quire codices were known that their simultaneous occurrence should have been evident to him. Turner (1977 p. 99) concluded rightly that 'Ibscher's sweeping claim must be regarded as not substantiated'.

Although the described construction of the single-quire codex seems to be the prevailing one, other ways of connecting a number of folded sheets are conceivable. Sideways stitching (or stabbing) is one of the possibilities, documented in several instances, such as two copies of Homer's Iliad in single papyrus quires from the fourth century (PML M 202 and BL Pap. CXXVI; see Kenyon 1891 pp. 81–92) and a fragmentary Hebrew single-quire codex of 24 sheets of papyrus originating from the Cairo Geniza and dated to the fourth or fifth century (Cambridge UL T.S. 6 H9–21; Diringer 1953 fig. IV 17; Sirat 1985 pp. 70–80).[8] The evidence is the lack of sewing holes in the centrefold, but the presence of holes along the inner margin, c. 5 to 10 mm from the fold itself. Nevertheless, it is noteworthy that stabbing may also be evidence of later repair, like in the case of Bodmer P. XXV–XXVI (Kasser 1971).

NOTES

1. Robinson's terminology for the description of bindings differs from the seemingly conventional bookbinding terminology and is sometimes confusing: for example, the term 'thong' is used for three different structures and turn-ins are termed 'strips of leather, folded'. The term 'cartonnage' – current with Egyptologists – seems to be inappropriate to differentiate between pasteboard or one or several layers of pastedowns.
2. Contents and covers (except for the covers of Codex II, see Chapter 2, note 9) are kept separately at the Coptic Museum in Cairo. The covers were sealed in Plexiglass boxes in 1975 (Marshall 1993 pp. 135 ff.).
3. The flap which is an extension of the lower cover going over the front edge and halfway across the upper cover is referred to as envelope flap.
4. According to Robinson (1975 p. 172) the leathers of the Nag Hammadi covers were initially designated as goatskin but, in most cases, later found to be sheepskin. This sharp distinction of either goat or sheep seems to be an oversimplification when applied to skins of these two species, which had been domesticated and cross-bred in the Middle and Near East since prehistoric times, as documented in the monumental work of Ryder (1983). Many of the ancient species are in fact sheep hair, with a hair follicle pattern between that of modern goat and wool sheep (Reed 1972 p. 287).

5. The roman numerals refer to the final official numbering as given in the *Facsimile Edition of the Nag Hammadi Codices* (1972–7); it replaces earlier ones, including those used by Van Regemorter (1960) and Doresse (1961).
6. Although all authors describe tackets as made of leather, I have doubts about the rightness of their identification of the material: the so much greater strength and durability of parchment or rawhide, materials that were likewise available (Lucas and Harris 1989 p. 37), appear to be far more suitable for tackets and also for stays.
7. This codex underwent surgery for a second time in the late 1950s: its separated leaves were joined again and laminated with silk gauze, the single-quire structure was reconstructed and mounted in a new calfskin replica of the leather cover (Auster et al. 1959) – one wonders to what good purpose?
8. I am grateful to Dr Jennifer M. Sheppard for examining for me the dismantled fragments of Cambridge UL T.S. 6 H9–21 and confirming that there are no sewing holes in the centrefolds. Several other examples of stabbing single-quire codices are given in the unpublished typescript of Father Theodore C. Petersen's *Coptic Bookbindings in the Pierpont Morgan Library* (Petersen 1948), which contains a wealth of information on early binding structures. An updated edition is being prepared by John L. Sharpe III (Depuydt 1993 p. XI).

Chapter 2 The first multi-quire Coptic codices

2.1 INTRODUCTION

In Chapter 1 we saw that the single-quire codex was in use in ancient Egypt during the third and fourth centuries AD. But it was not the only codex form at that time: multi-quire codices are extant even from as early as the second century AD and considerably outnumber the single-quire type. From the data of Roberts and Skeat (1983 pp. 37–44) we can conclude that over 500 codices have survived from the period before 400 AD, the majority probably of the multi-quire type. Turner (1977 pp. 61–4) examined the make-up of the quires of 56 codices (36 papyrus, 20 parchment) dating from the third to the seventh centuries: the number of folded sheets in a quire ranged from one to nine, four sheets (*quaterniones*) being most frequent (22 cases). Papyrus seems to have been the preferred writing material in the earlier period: out of about 250 codices extant from before 300 AD, only 11 per cent were written on parchment (calculated from the data of Turner 1977 pp. 89–94); this figure is hardly astonishing if we remember that virtually all finds originate from Egypt, the home of papyrus.

In this chapter an attempt is made to examine the binding structure of the earliest multi-quire codices from their first beginnings to the seventh century. This period spans from the rise of Coptic communities as part of the Byzantine Empire to the Arab conquest of Egypt around 640 AD. Only a very small fraction of the codices from this period have retained their original binding more or less intact. The corpus listed in Table 2.1 comprises 11 parchment codices (10 with wooden boards, one with papyrus boards) dating from the fourth to the seventh centuries and containing Biblical texts. Their most fundamental common features are that their quires are joined to form a bookblock by sewing through the centrefolds using the link-stitch technique and that the bookblock is attached to the boards by means of the extensions of the leather back strip. Codices A, B, C, D and E were found in the 1920s near Saqqara, under the ruins of the Monastery of Apa Jeremiah; their bindings were dismantled and only insufficiently described by Lamacraft (1939). The Freer Gospels, known since 1906 and believed to have come from the Monastery of the Vinedresser near Giza, has detached wooden covers with paintings of probably a later date, still containing vestiges of the board attachment (Morey 1912); the textblock and sewing already showed unambiguous signs of repair when examined by Petersen.[1] The Glazier codex, PML M 910, the Scheide codex and the Barcelona codex surfaced in the early 1960s (site uncertain); although no longer intact, they have still managed to escape harsh conservation treatment. The latest find is the Mudil codex, unearthed in a cemetery near al-Mudil, Middle Egypt, in 1984; the binding

Table 2.1 Early parchment multi-quire codices

No.	*Owner*	*Shelfmark*	*Contents*	*Date*	*No. of quires*	*Dimensions**	*Sewing stations*	*Reference*
1	Chester Beatty	A (MS 813)	Pauline Epistles, John	vi	26	152 × 130	4	[1, 2]
2	Chester Beatty	B (MS 814)	Acts Apostles, John	vii	21	121 × 102	4	[1]
3	Chester Beatty	C (MS 815)	Psalms 1–50, Matthew	vi	20	98 × 86	3	[1]
4	Michigan UL	D (MS 167)	Psalms 51–151	vi	25	121 × 102	4	[1]
5	Michigan UL	E (MS 166)	Theol. miscellanea	vi	?	83 × 70	?	[1]
6	Freer Gallery	Inv. 06.274	The Four Gospels	v	27	210 × 140	5	[3, 4, 5]
7	New York PML	Glazier 67	Acts Apostles	iv	15	120 × 106	3	[6, 7, 8]
8	New York PML	M 910	Acts Apostles (?)	iv (?)	?	?	?	[7]
9	Princeton UL	Scheide 144	Matthew	iv/v	30	125 × 105	3	[9]
10	Barcelona UL	PPal.Rib.181–3	Luke, John, Matthew	v	29	200 × 165	4	[10, 11, 12]
11	Cairo Copt. Mus.	Mudil codex	Psalms	v/vi	32	178 × 128	4	[13, 14]

* Dimensions are given in mm for height × width of the boards; the bookblock is mostly identical or slightly smaller, in no. 10 up to 7 mm. References: [1], Lamacraft (1939); [2], van Regemorter (1958a); [3], Morey (1912); [4], G.D. Hobson (1939); [5], Petersen (1948); [6], Kebabian (1967); [7], Needham (1979); [8], Schenke (1991); [9], Schenke (1981); [10], Quecke (1972); [11], Quecke (1977); [12], Quecke (1984); [13], Gabra (1995); [14], Sharpe (1995).

was hastily taken apart, its structure luckily recorded in some detail (Gabra 1995; Sharpe 1995).

2.2 THE LINK STITCH

Before examining the sewing of these early codices, the basic principles and terminology of the link stitch in its many variants should be introduced.[2] The actual linking process can be described in terms of the thread movement as follows: the thread, proceeding in the centre-fold, exits through a sewing hole at a given sewing station where it drops in order to make a link under the sewing thread of the previous quire (actually, it links under the sewing thread connecting the two previous quires); it then climbs and re-enters through the same hole and makes a long stitch to the next sewing station (Figure 2.1).

Several variations are possible: in [a] the exiting thread continues forward in the same direction and, after having made the link, crosses itself when re-entering (configuration α); in [b] the exiting thread bends backwards and, after having made the link, slips under itself before re-entering the quire (configuration β). The linking may take place with the sewing of the previous quire as in [a] and [b], or with the sewing of the last but one or two quires as shown in [c] and [d]. The link with the penultimate quire has been called the

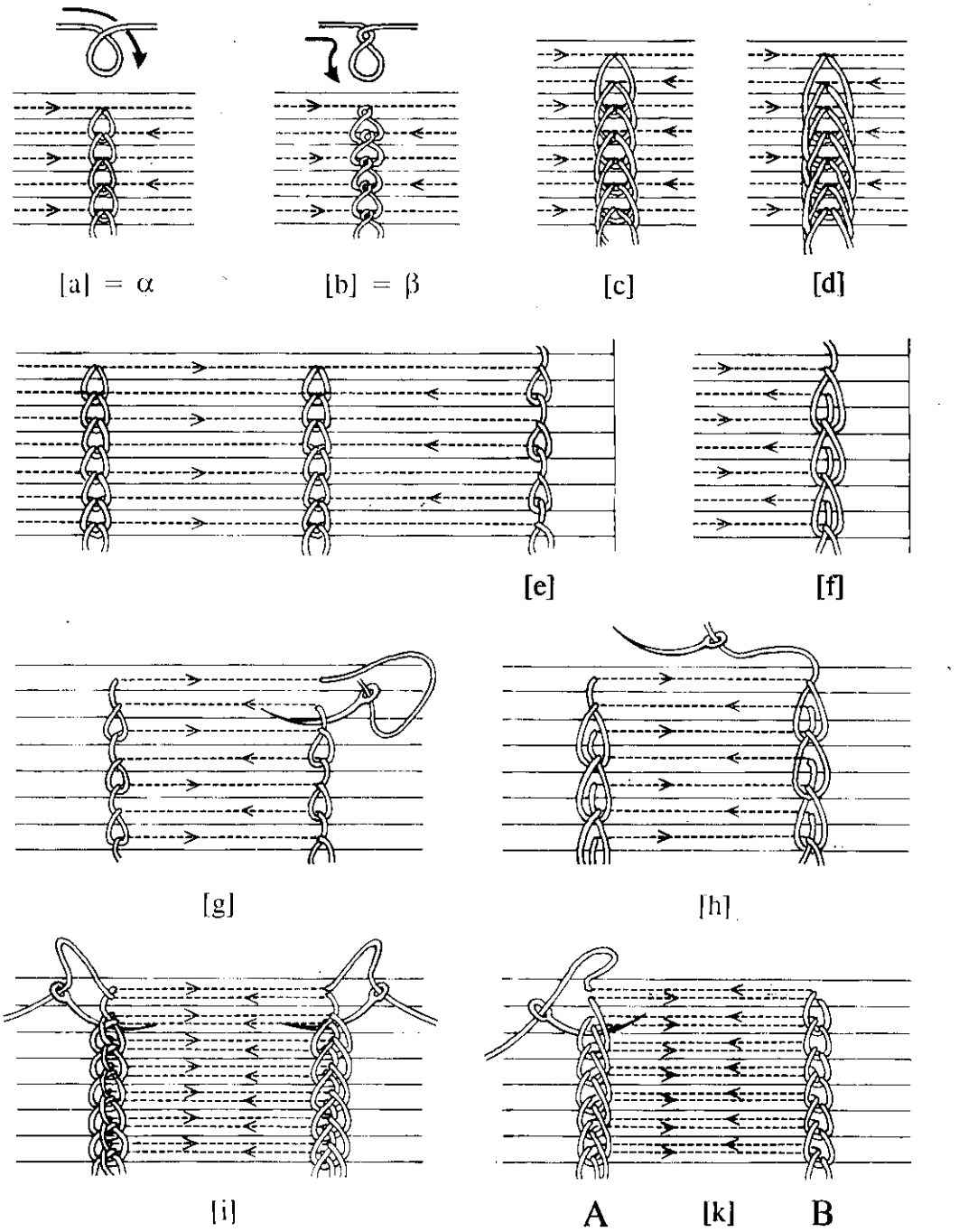

Figure 2.1 Basic principles of link-stitch sewing as seen on the spine. Broken lines show the thread inside the centrefolds, arrows indicate the direction of sewing (for details see text).

extended link stitch (Gnirrep and Szirmai 1989); it can be more exactly described as one-step, two-step, three-step link stitch, etc., provided it can be determined. The mechanical advantages of this type of extended linking are obvious: the number of effective connecting threads is doubled or tripled, thus increasing their coherence; the resulting chain of links on the spine has the appearance of a bulky braid.[3]

The examples considered so far have referred solely to the intermediate sewing stations. At the outermost sewing stations at the head and tail the thread climbs and changes over to the next quire; the configuration of the link stitch changes accordingly [e]. As the sewing thread proceeds in the centrefolds of the consecutive quires in alternating opposite directions and change-over takes place alternately at the head and tail, the total number of links at these sewing stations is reduced by a factor of two. Thus, at sewing stations with 'continuing' link stitches the number of links equals the number of quires, while at the outermost sewing stations it is halved. This remains true even if a two-step link stitch is used [f], which does increase the bulk of the thread but not the number of links.

In the above examples the number of sewing stations was assumed to be greater than two. Slight variations arise when paired sewing stations are employed; two cases of such sewings are illustrated in [g] and [h]. Comparison with the link-stitch configurations [e] and [f] shows that we are in fact dealing with a set of climbing link stitches; either station of the pair acts as an outermost sewing station, thus comprising a reduced number of links (this effect is known in the 'simple' link-stitch sewing of later Islamic bindings, see section 5.3). The number of such paired sewing stations may vary, but usually two pairs (i.e. four sewing stations) are used and the sewing carried out with two lengths of thread and two needles. This particular sewing is described by the French term '*couture à deux aiguilles*', an ambiguous and therefore inappropriate term since it could also refer to the sewing where two needles are used for a single pair of sewing stations [i]: a single thread is needled at both ends, each needle entering one of the sewing stations of the pair; the two ends of the thread pass each other in the centrefold, and exit in order to make a link under the sewing of the previous quire before entering the following one. The number of links equals the number of quires and there are two long stitches inside each centrefold (this sewing is characteristic of the Ethiopian codex, see section 4.2). Finally, there is a similar paired link-stitch sewing where only one needle is required, see [k]. The thread moves forth and back inside the centrefold, resulting in a slightly different configuration of the link stitch at either sewing station: at station B, the thread exits, drops to make a link and re-enters the same quire; at station A, the same movement is completed by climbing to the next quire. The chains at station A and B are distinguishable by their link stitches comprising three or two thicknesses of thread; the fold patterns of [i] and [k] are identical.

The morphology of the link stitches on the spine allows us to determine the sequence in which the quires have been sewn: the 'arrow' on the link points to the direction of the sewing. Often it is more difficult to elucidate the actual beginning of the linking process: when starting with the very first quire, there is no previous or penultimate quire – where should the first link be made? One way is to lay a length of thread along the spinefold and hook around it the first link at each sewing station; loose ends of thread found on the spine may indicate the application of this method (Adam 1923–4). Another method illus-

trated by Jacobs and Rodgers (1990 p. 118) would employ pamphlet sewing for joining the first two quires and using the short connecting threads as anchors for link-stitching the third quire. Finally, it should be noted that in any of the link-stitch sewings either the α or ß configuration (Figure 2.1[a] and [b]) can be employed; their distinction by mere visual inspection of the intact sewing is hardly feasible – it requires dismantling and careful reconstruction of the thread movement.

2.3 SEWING

All codices listed in Table 2.1 were sewn with a link-stitch technique. The sewing was often damaged and therefore difficult to reconstruct. Lamacraft (1939 pp. 219–20) correctly observed on Codices A, B, C, D and E that 'at each exit of the needle a looped chain stitch was made around the thread of the previous section'. Talking about the Glazier codex Kebabian (1967 pp. 27–9) described incompetently that 'knots are chainstitched to those of the quire following' and wrongly concluded that the 'lack of a continuous sewing along both inner and outer folds resulted in a quite weak structure'. Petersen (1948) found the link stitches on the spine of the Freer Gospels damaged, but had no doubt that it was a link-stitch sewing. The spine of the Scheide codex is no longer intact and only a few 'knots' are left of the chains across the spine (Schenke 1981 p. 9); the link stitches on the Barcelona codex are partly preserved, but encrusted with adhesive to the point where it had been impossible '*festzustellen, wie der Faden bei der Verknotung geführt wurde*' (Quecke 1984 p. 11). The damaged condition of PML M 910 merely allows us to establish the employment of link-stitch sewing.[4] From the dismantled binding of the Mudil codex only a single knot has remained, which, nevertheless, proves to be part of a link stitch; the sewing holes are apparently cut as V-shaped nicks (Sharpe 1995).

Intact chains of link stitches on the earliest codices are of such rare occurrence that, as in the case of Codex D (Figure 2.2), we have to consider ourselves lucky to have at least one photograph which documents the original spine of the binding before it was dismantled (Lamacraft 1939 pl. Vd). Yet the remains of what has been spared by gnawing insects only allow the plain observation that the sewing was at four stations and that the chains seem to have had the same configuration.

Further clues to elucidate the type of link stitch used can be obtained by observing the disposition of the sewing stations and the appearance of the thread in the centrefolds, that is, the fold pattern. Lamacraft (1939) deserves credit for having recorded the stitches in the successive centrefolds of the ancient codices he studied; Petersen (1948) likewise recorded the double thread which he had found in most quires of the Freer Gospels. Fortunately, the information of the fold pattern is often available since the thread lies well protected in the centrefolds even of damaged codices; imprints of thread can also be indicative. The sewing of the Scheide codex was probably done with a single thread except for the first and last two quires where the thread was doubled as in Codex C (Schenke 1981 p. 9). The paired sewing stations in the Barcelona codex had independent sewing and most likely double thread in the centrefolds (Quecke 1984 p. 11).[5] The same sewing of two pairs of

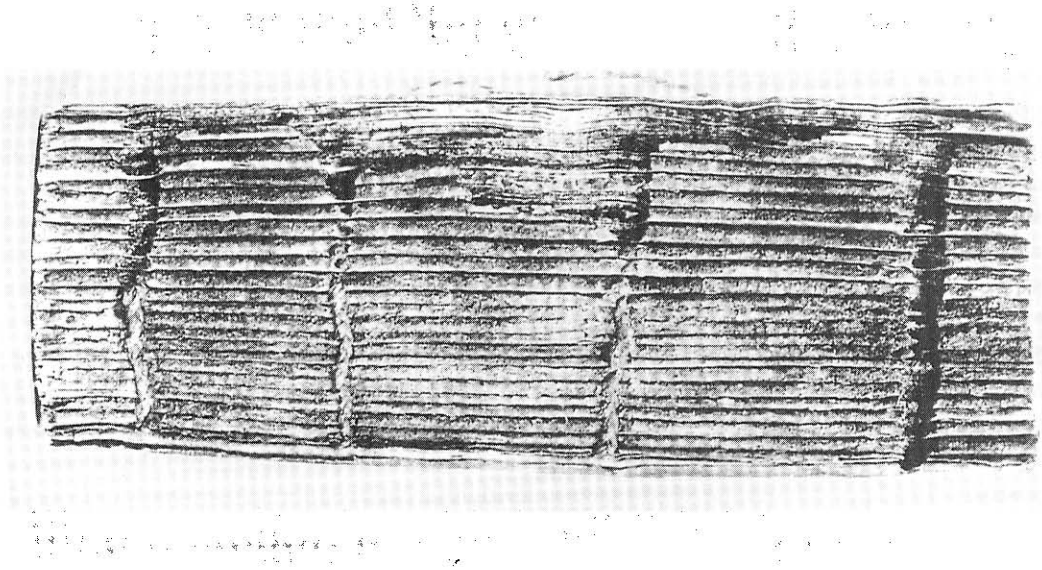

Figure 2.2 Spine of the sixth-century Codex D (Ann Arbor MI, Michigan UL MS 167; from Lamacraft 1939 pl. Vd).

sewing stations was recorded for several of the multi-quire parchment codices of the Geneva Bibliotheca Bodmeriana, for example, Bodmer P. VI (Kasser 1960), P. XVI (Kasser 1961a), P. XIX (Kasser 1962b) and P. XXII (Kasser 1964). The examples of fold patterns assembled in Figure 2.3 have three striking features: the varying number and disposition of sewing stations and the prevalence of double thread in the centrefolds. The latter may be restricted to the first and last quires (a sound measure to counter the strain on the joint region) or may be taken through the whole bookblock. How these sewings actually had been worked remains an intriguing question, particularly as often several sewings appear to be feasible for the same pattern. This shall be illustrated in the most simple sewing, which is shown in Figure 2.3[c] and based on Codex C. The bookblock might have been sewn with a single thread using one needle, extending sewing [k] in Figure 2.1 by an intermediate sewing station. Figure 2.4[a] shows the sewing beginning with a free end of the thread along the spinefold to anchor the first links; the thread then moves back and forth in the consecutive quires. Only one of the threads forms a link when passing the intermediate sewing station B, in order to keep the number of links of the chains equal at all three sewing stations. The other possible sewing (Figure 2.4[b]) employs a thread needled at both ends (as in the basic pattern [i] in Figure 2.1); its middle portion is laid against the spinefold of the first quire; the two needles enter the outermost sewing stations and move alternately in opposite directions in the consecutive centrefolds. Here too, one of the threads skips linking at the intermediate sewing station B.

The fold pattern of Codex A is even more intriguing, since Lamacraft (1939) noted in some centrefolds aberrant stitches extending to the head or tail edge (Figure 2.3[a]); disregarding these as possibly being only dislocated ends of a broken thread, the sewing prob-

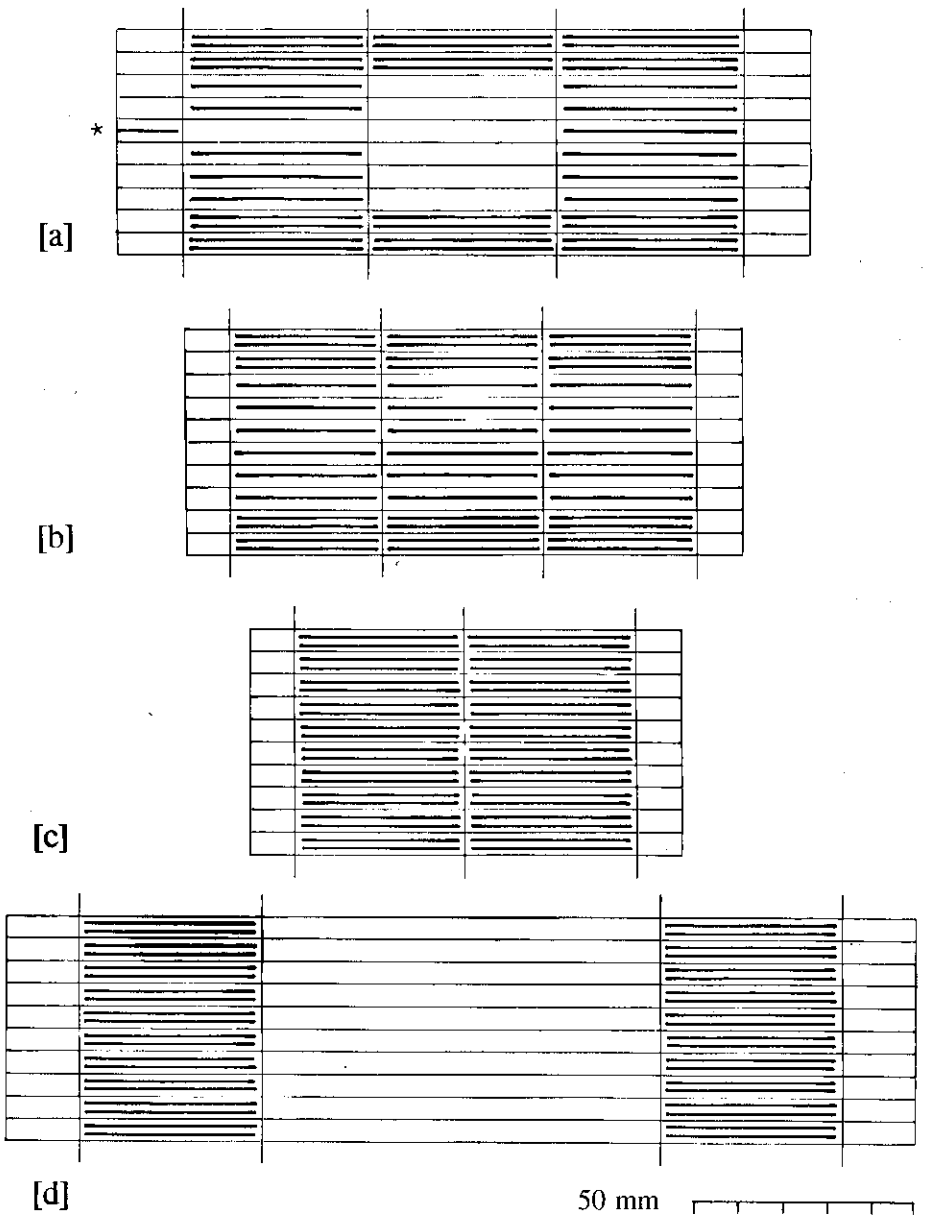

Figure 2.3 Fold pattern of codices 1, 2, 3 and 10 of Table 2.1. Diagrams **[a], [b] and** [c] correspond to Codex **A, B** and C (Dublin Chester Beatty Library MS 813, MS 814, MS 815 respectively) and are based on Lamacraft (1939). Asterisk in [a] indicates a piece of thread as if sewn up to the head edge, but this is likely to be the result of dislocation. Diagram [d] is the fold pattern of Barcelona UL PPalau Rib. 181–3 and is based on the data of Quecke (1984). Only part of the total number of quires is shown; the height of the spines is to scale, the distances of the sewing stations are approximations.

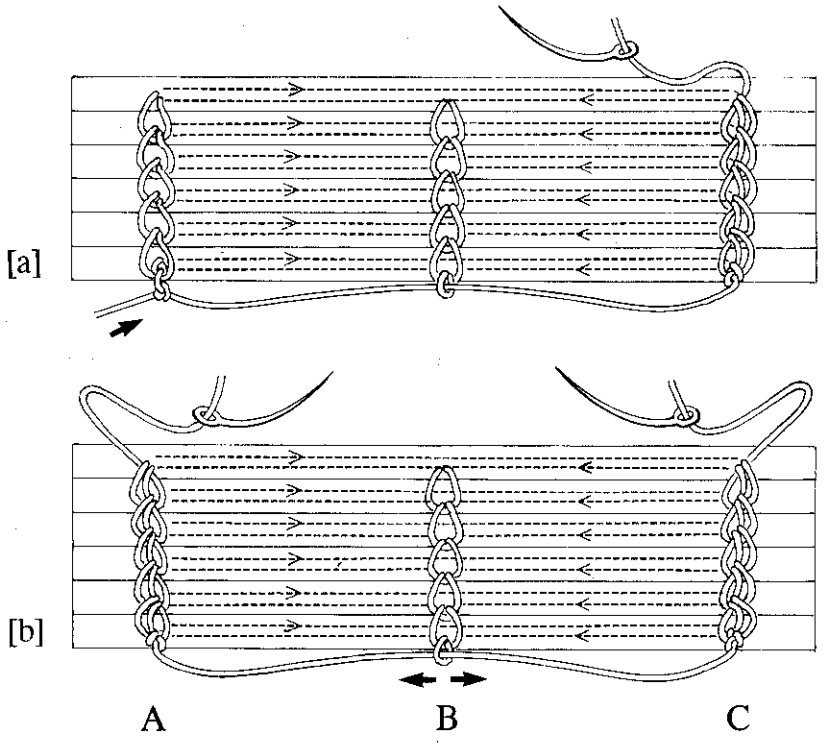

Figure 2.4 Two alternative methods resulting in link-stitch sewing on three stations, compatible with the fold pattern [c] in Figure 2.3: [a], one-needle sewing on a paired station (see Figure 2.1[k]) extended by a third intermediate station; [b], similarly extended two-needle sewing (see Figure 2.1[i]). Arrows indicate the beginning of sewing.

ably represents a variant of [i] in combination with [g] and [h] in Figure 2.1.[6] The sewing on two paired sewing stations (Figure 2.3[d]) can be obtained by using either sewing [i] or [k] in Figure 2.1.

Sewing through the centrefolds seems to have been the main principle of connecting the quires of a multi-quire codex. Still, we know of at least one instance where quires of single folded sheets (bifolia) had been assembled into a book by stabbing, not unlike some single-quire codices (see section 1.6). The sewing holes are not in the centrefold, but a little away from it, as noted by van Regemorter (1955 p. 4) on the Dublin, Chester Beatty Library Bibl. Pap. I (Gospels and Acts, s. iii, 254 × 204 mm, 120 bifolia). It remains unsettled how this stitching was done and which materials were used. Lamacraft's record (1939) of the five codices he studied does not contain any information about the characteristics of the sewing thread. The thread in the Glazier codex is described as 'very thin shavings of leather rolled to form a thin cord' (Kebabian 1967 p. 29); this is suggestive of a material of animal origin (catgut?), often mentioned in connection with threads in Ethiopian codices, or possibly of a heavily waxed (varnished?) vegetable thread (see section 4.2). Of the sewing thread in the Scheide codex Schenke (1981 p. 9) solely states its veg-

etable nature; several of his illustrations allow for the estimation of *c.* 1 mm diameter. The same thread diameter is reported for codices Bodmer P. XVI (Kasser 1961a) and Bodmer P. XXII (Kasser 1964).

2.4 EDGE TREATMENT, ENDBANDS AND BOARDS

There is only indirect evidence of edge trimming of the bookblock. The fore-edges of Codices A, B and C show some ink decoration, hardly likely to be executed on untrimmed rough edges (Lamacraft 1939 pl. III). In Codices A and B leather tabs (page markers) were affixed to the fore-edge of the leaves to indicate the beginning of a new section. In Codex A 'no fragments of the original headbands remain, but the sewing holes occur at intervals in the book with traces of coloured thread in them' (Lamacraft 1939 p. 220); in Codices B and C 'traces of coloured headbands remain in the vellum' (Lamacraft 1939 pp. 227, 232) – that is all we learn. Endbands are not mentioned on any of the other codices referred to in this study; however, the finding of a piece of thread in the centrefold of one of the quires of the Scheide codex (Schenke 1981 fig. 15) as well as some holes close to the head and tail (Schenke 1981 figs. 1, 2) could suggest a pair of lost endbands. Similarly redundant holes at the head and tail of the spine of the Mudil codex could be evidence of earlier endbands (Sharpe 1995).

Nine of the codices listed in Table 2.1 have plain wooden boards, left uncovered; only the Freer Gospels carries painting of a probably later date (Morey 1912). The wood varies in density and colour from reddish-brown to dark brown. The boards of Codices A and B have been identified as boxwood (*Buxus*). The boards of the Glazier codex are thought to be of acacia and witness saw and rasp marks (Sharpe 1996a); those of the Mudil codex show saw marks, too, and evidence of smoothing by a drawknife or chisel (Sharpe 1995). The edges usually have a flat bevel, sometimes less prominent along the spine. The thickness varies from 4 to 9 mm. Holes, ranging in diameter from 3 to 5 mm, were drilled obliquely from the spine edge of the boards towards the inside; they served to accommodate hinging thongs connecting the two boards to the bookblock. This type of board attachment is best preserved on the Glazier codex (Figure 2.5) and is representative for PML M 910, the Scheide codex, the Barcelona codex and the Mudil codex, as well as for a detached pair of boards (175 × 140 mm) which surfaced with Bodmer P. XIX but have not been attributed to it (Kasser 1962b pp. 13, 16).

The board attachment (Figure 2.6) is constructed as follows: several leather hinging thongs (three in the Barcelona codex, four in PML M 910, the Scheide codex, the Mudil codex and Bodmer P. XIX, five in the Glazier codex) are pasted across the spine of the bookblock; the slips of the thongs are passed through corresponding slits in the leather back strip which is pasted to the spine. The slips of the thongs are then threaded through the holes in the boards and together with the extensions of the back strip pasted down on the inner face of the boards. Finally, these are lined with the first leaf of the first quire and the last leaf of the last quire as pastedowns.

The board attachment of Codices A and B and the Freer Gospels appears similar,

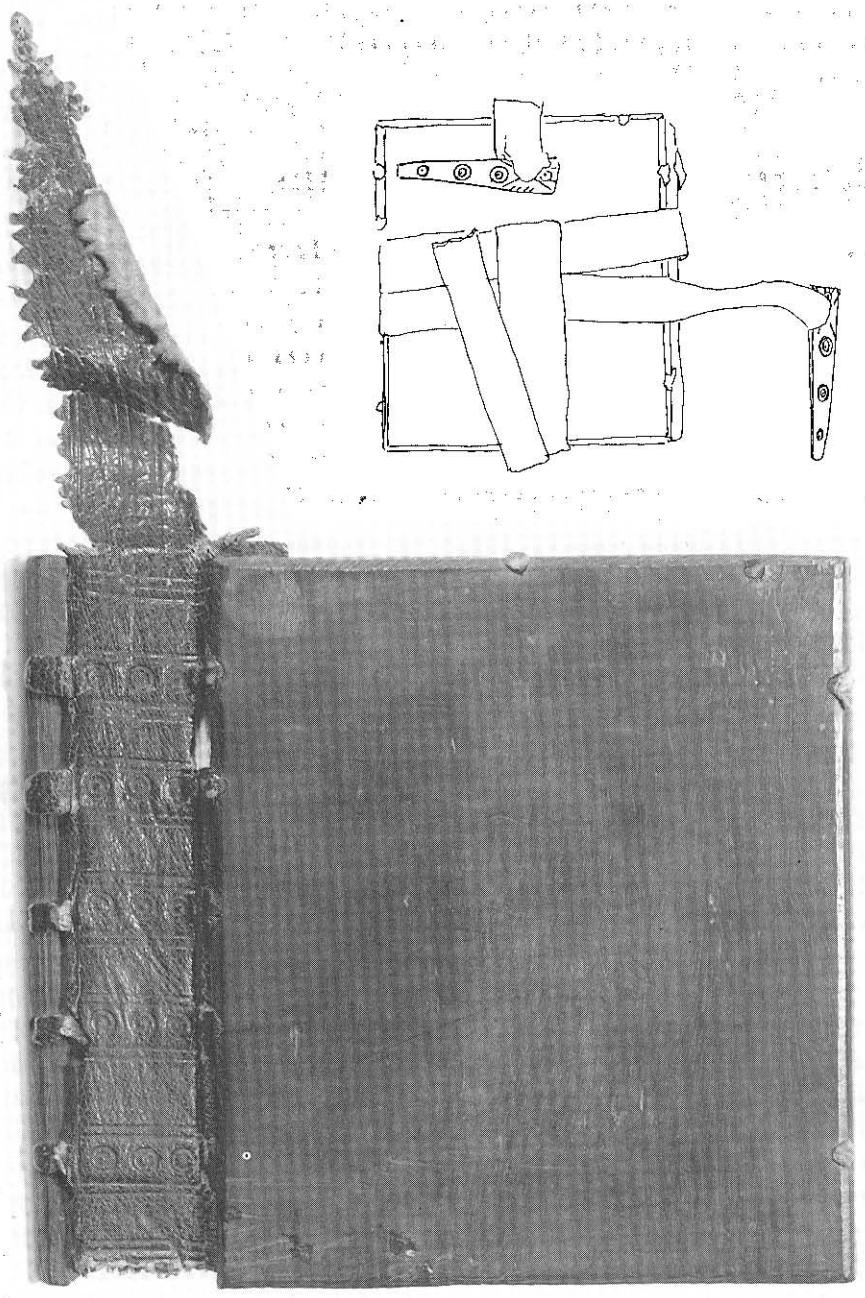

Figure 2.5 The upper cover and back of the fourth-century Glazier codex (PML G 67; 120 × 106 mm) with a protective edge flap at the head. Diagram (inset) shows its two wrapping bands with ivory pegs (based on a photograph in Kebabian 1967 fig. 1).

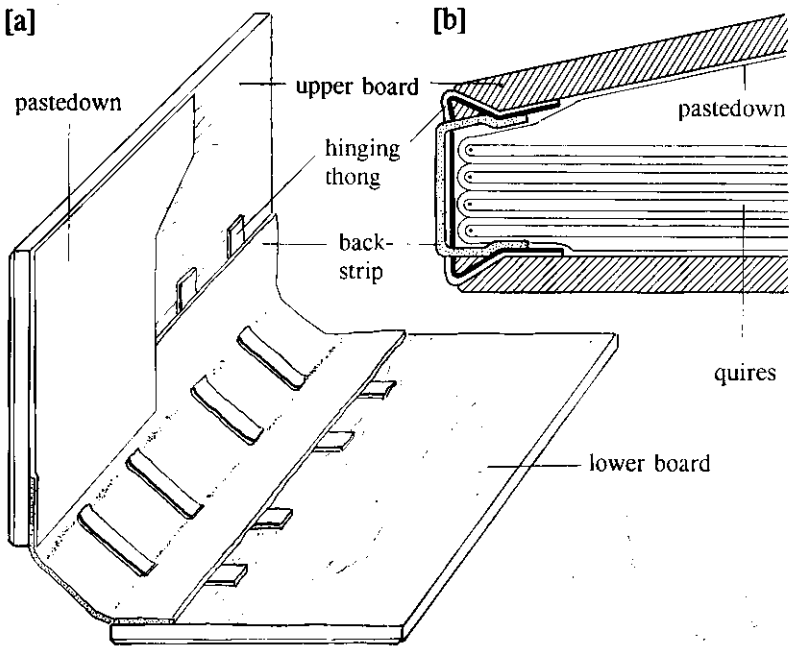

Figure 2.6 Board attachment of early Coptic codices, based on the structure of the Glazier codex (PML G 67). Diagram [a] presents the inner face of the covers, [b] shows a cross-section of the hinging thongs passing through the boards.

but is less clear in its make-up. The number of holes along the spine edge of the board is much larger: 26 in each board of the Freer Gospels, 34 or 35 on Codex A and 38 or 40 on Codex B. Lamacraft's description of Codex A suggests that hinging was achieved with 34 or 35 individual thongs, which were 'glued down on the strip of vellum lining the back of the book, and were secured by the leather back being planted over them' (Lamacraft 1939 p. 221). Petersen (1948 p. 59) and later again van Regemorter (1958b p. 23 pl. 9) suggested that this large number of thongs had been made by incising both extensions of the back strip. On the Freer Gospels Petersen noticed further that its spine had been additionally lined with heavy linen cloth with extensions (25–30 mm); these extensions were stuck down to the inner face of the boards covering the thongs.[7] Originally the inner faces of the boards of the Freer Gospels were covered with parchment pastedowns; the same was found on Codices A and B, where the first and last leaf of the textblock were stuck down on the inner face of the boards, hiding the thongs which had first been covered with a strip of leather (Lamacraft 1939).

As Codex C is the only full leather binding of the 11 codices under consideration, it is particularly unfortunate that Lamacraft could not record the attachment structure of the too-damaged boards of papyrus waste, but did record that 'the cover of goat-skin was decorated with pen and ink' (p. 232, fig. 8). The leather covering of the other codices seems to have been restricted to the back, in only a few cases well preserved and decorated. Still in

pristine condition is the back covering of the Glazier codex,[8] having a simple decoration with blind tooling, partly running over the edge flap at the head (see Figure 2.5). Similar edge flaps have been found on the Mudil codex (Gabra 1995 pp. 30–1). The backs of Codices A and B, assumed to be of goatskin, are blind tooled with lines and stamps of geometrical and animal figures; allegedly Codex B had 'a fillet of burnished gold foil' at the back (Lamacraft 1939 p. 228).

Van Regemorter (1958b) described a number of loose wooden boards that she claimed to have come from bindings, although none of them exhibits any holes in an array comparable to those in the codices described above. According to Powell (1963) only the pair of boards of Dublin, Chester Beatty Library Inv. nos. 3–3a are justifiably described as boards of a binding: cedarwood, 124 × 84 × 9 mm, with a 3 mm deep groove set 10 mm away from the supposed spine edge, with two holes drilled from the bottom of the groove towards the edge, next to the grooves a strip of 'leather filigree work with a golden fond' (van Regemorter 1958b pp. 18–20, figs 2, 3, pl. 7). Powell (1963) attempts to correct van Regemorter's reconstruction of the board attachment by offering the plausible suggestion of a structure that had been hinged with the sewing thread itself.

2.5 FASTENINGS AND OTHER APPENDAGES

Leather wrapping bands were used to keep the codex closed: they were fastened through holes in the upper cover and tied around the codex several times. They have been preserved in an incomplete state in Codices A and B and the Glazier codex; Codex C, PML M 910, the Scheide codex and the Mudil codex retain evidence only in the form of holes and

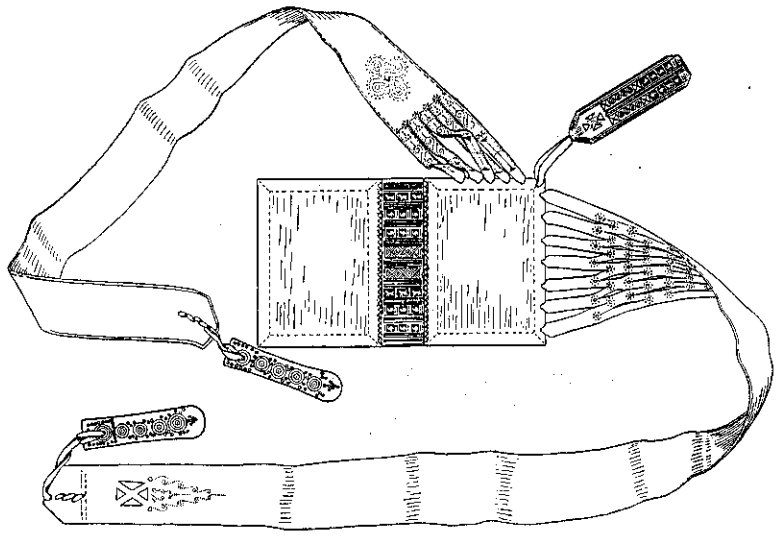

Figure 2.7 The wrapping bands and bookmarker of the seventh-century Codex B (Dublin Chester Beatty Library MS 814; from Petersen 1954 fig. 8).

leather vestiges. The most elaborate examples are Codices A and B which are both equipped with two wrapping bands, one anchored in seven or eight holes along the front edge and the other in five holes at the top edge of the upper board (Lamacraft 1939). The ingenious way of widening the base of the bands by incisions, their decoration (in ink) and bone pegs securing the wrapping are illustrated in Figure 2.7. The upper board of the Freer Gospels has an even larger number of holes, presumably for the same purpose: eight along the top edge and seven along the upper and lower part of the front edge. Petersen (1948 fig. 31) interprets these two sets of holes along the front edge as a bipartite beginning of a single front wrapping band. The wrapping bands of the other codices seem to be simpler. The Glazier codex has managed to preserve its wrapping band at the top and one of the once two wrapping bands at the front edge of the upper board (Needham 1979 p. 10). The upper board of the Scheide codex (Schenke 1981 p. 8) and Bodmer P. XIX (Kasser 1962b p. 15) present the same array of holes, with remnants of leather thongs. The Barcelona codex is recorded to have only three holes at the front edge of the upper board (Quecke 1984 p. 14).

Interesting depictions of wrapping bands on early codices have been found in contemporary art, as for example in a fourth-century fresco in the Roman catacombs (Wilpert 1903 pl. 213), in fifth-century mosaics in the S. Sabena in Rome and in sixth-century mosaics in the Mausoleum of Galla Placidia in Ravenna (Wilpert and Schumacher 1976 p.

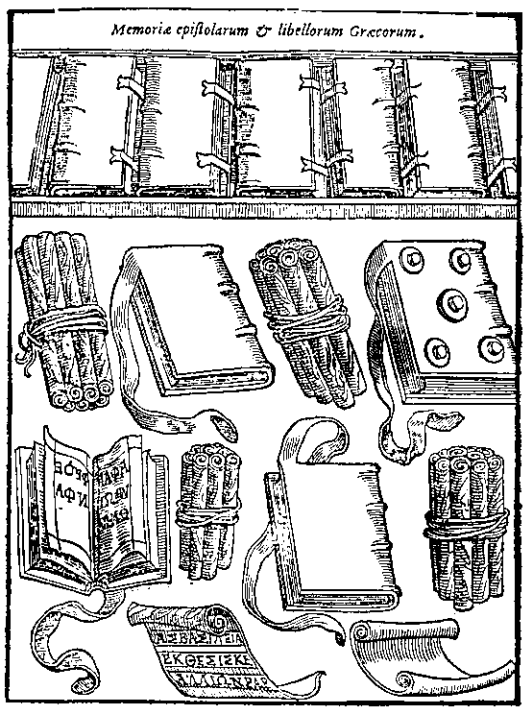

Figure 2.8 Representations of several codices with wrapping bands on the insignia of the office of the *magister scriniorum* (from *Notitia utraque Dignitatum* [. . .], 1606 p. 62).

307 fig. 24, p. 319 fig. 74). Several details in illustrations of codices that have come down to us from the *Notitia Dignitatum* (Goodburn and Bartholomew 1976; Berger 1981) have been assumed to represent '*Eigenthümliche Einbände mit überschlagenden Zipfeln zum Verschliessen*' (Wattenbach 1871 p. 222); they could be corrupted versions of ancient fastenings, entirely forgotten and unknown to late medieval artists (Figure 2.8).

All boards of the codices in Table 2.1 (except for Codex C and the Barcelona codex) have one or two further holes in the top right-hand or left-hand corner of the upper or lower board, with vestiges of leather thongs suggesting they may have belonged to bookmarkers. Such bookmarkers, of leather with parchment lining and decoration in blind tooling, have been preserved with Codices A and B (Lamacraft 1939 pp. 226, 231, pl. V) and some remnants with the Glazier and Mudil codices. Ends of leather thongs are present in corresponding positions in the boards of Bodmer P. XIX (Kasser 1962b).

2.6 PAPYRUS CODICES WITH PASTEBOARD COVERS

The above examination of binding structures has referred exclusively to multi-quire codices written on parchment and provided with wooden boards (with the exception of Codex C). Since in this period papyrus was much more frequently used as writing material, one would expect to encounter a larger number of extant bindings of multi-quire papyrus codices. Yet this is not the case, for various reasons. One lies in the approach to the early days of papyrology, which regarded the sheer salvage of the texts as the highest priority. This procedure usually led to the destruction of the binding, hence the loss of evidence on its structure. Another obvious reason is the often very damaged condition of finds: Ibscher (1933) compares the condition of a series of Manichean codices (of the fourth or fifth century) to lumps of peat. He assures us that nothing is left of the sewing structure, assumes that the boards had been covered in lavishly decorated leather and praises the high standard of the Manichean bindings (1937 p. 15),[9] but fails to describe any vestiges or to record any clue as to the method of board attachment (1933 p. 85).

One of the earliest of such bindings in papyrus pasteboards is a codex probably dating from the third century (BNF MS suppl. gr. 1120, two texts of Philo of Alexandria, 178 × 165 mm, four quires), found in 1889 in Coptos, Upper Egypt. The concise description of the binding (Scheil 1893) mentions that sewing was carried out with vegetable fibre applying parchment stays, that there was a parchment bookmarker and a reinforcement of the covering leather with pasteboards made up of fragments from a Gospel; the upper cover was extended into an envelope flap with a leather strap for closing the codex (Figure 2.9). Another binding of this type belongs to the Nag Hammadi find (Codex I) and contains two large quires (c. 300 × 150 mm, 73 leaves). It has semi-limp covers, similar to the single-quire Nag Hammadi codices (see Figure 1.1), stiffened with a lining of used papyrus leaves. Each of the two quires had been separately joined to the cover with tackets through leather stays in the centrefolds and knotted on the outside of the back (Doresse 1961 pp. 47–8; Robinson 1975 pp. 176–80). The leather envelope flap on the upper cover (possibly with a wrapping band) is partly lost; there are leather ties at the head and tail of both covers.[10]

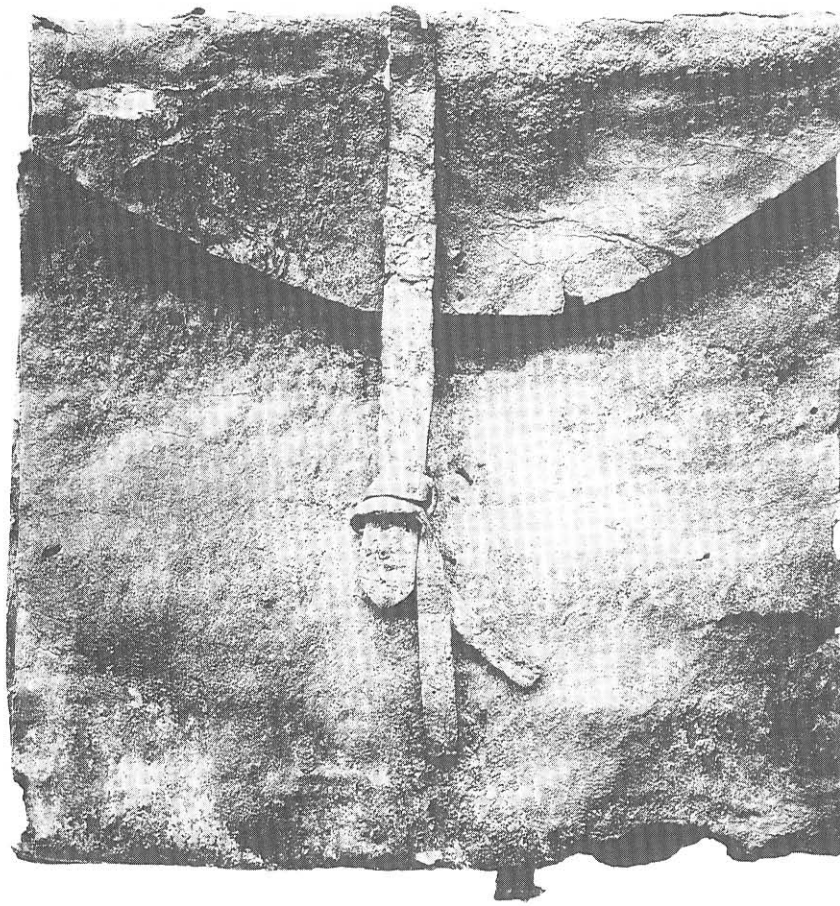

Figure 2.9 Leather cover of BNF MS suppl. gr. 1120 (s. iii/v [?]; 178 × 165 mm; from Scheil 1893 pl. 4).

Similar semi-limp bindings are found on several of the Bodmer papyri, acquired from another important find of early codices in the 1950s; the site of origin is uncertain, but in all likelihood can be attributed to the Pachominian monastery near Dishna, Upper Egypt (Robinson 1990–91). A good example is the incomplete binding of Bodmer P. XXIII (200 × 135 mm, five quires), which is briefly described and sketched by Kasser (1965 pp. 8–15). It is a semi-limp binding with the leather covering reinforced with a lining of a few layers of used papyrus. The turn-ins of the leather covering are secured with tackets or rather short stitches of lacing and covered by the first and last leaves of the textblock; the upper cover shows certain evidence of flaps on all its edges and ties or bookmarkers, suggested by vestiges of leather thongs. A slight modification of this type of board attachment, which relied entirely on the connection of the bookblock to the covers by the sewn-on pastedowns, can be found in the binding of the parchment codex Bodmer P. XVI (165 × 131 mm, six quires, two pairs of sewing stations; Kasser 1961a), where the pasteboards are made of blank instead of reused papyrus leaves (Figure 2.10[a]). A further example is a fifth-century

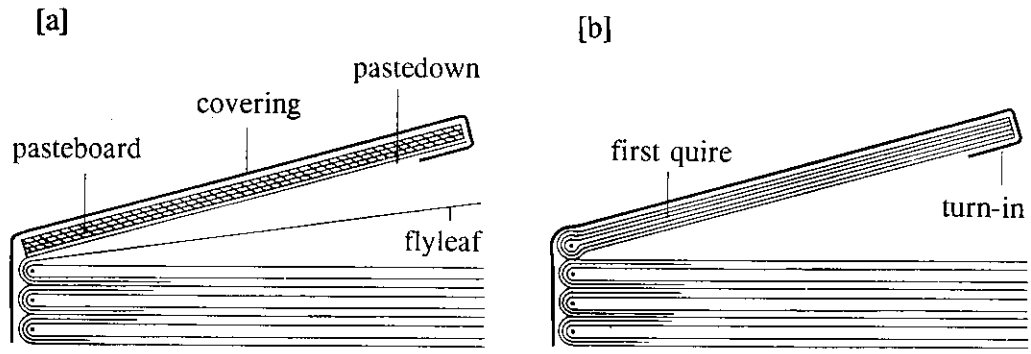

Figure 2.10 Two different methods of board construction: [a], the first leaf of the first quire is pasted down on the inner face of the upper board; [b], all leaves of the first quire are pasted together *in situ* to form the upper board ([a] is reconstructed after Bodmer P. XVI, [b] is based on Bodmer P. III).

binding (Joshua, 185 × 125 mm, eight quires, two pairs of sewing stations, thread diameter of *c.* 1 mm) that was split into two parts, which are today retained as Bodmer P. XXI and Dublin, Chester Beatty Library Acc. no. 1389 (Shore 1963 pp. 9–10 and pls. I, II; Kasser 1963 p. 9 and pl. I). The binding of Bodmer P. XVII (Kasser 1961b pp. 7–8 and pl. I), a seventh-century papyrus codex, probably repaired and in worn condition, deserves mention for its blind-tooled leather covering and its coarse cloth lining (see note 7).

An improvement to the method of board attachment described above is evident in the bindings of two other Bodmer papyri. The badly damaged binding of Bodmer P. III (232 × 165 mm, seven quires of six leaves each, two pairs of sewing stations) seems to have had pasteboards that were made of the complete first and last quires comprising 24 reused papyrus leaves; the sewing thread (diameter *c.* 1 mm) was thus embedded in the centrefolds of the two quires of the *in situ* constructed boards (Kasser 1958). Unfortunately, the upper cover and the first part of the text are virtually lost; the lower cover has retained its pastedown consisting of the last blank leaf of the textblock and some of its leather covering. In Bodmer P. XVIII (145 × 140 mm, six quires, three sewing stations, thread diameter *c.* 1 mm) the first and last quires making up the board are of four sheets of (reused?) papyrus (Kasser 1962a). Figure 2.10[b] shows the principle of this construction in which the boards are soundly integrated with the sewing structure.

NOTES

1. Father T.C. Petersen recorded many of his observations on the Freer Gospels in his unpublished typescript on the Coptic bindings in the New York Pierpoint Morgan Library (see Chapter 1, note 9); a detailed description is contained in another of his typescripts (1957) which is preserved together with curatorial records (Washington DC Freer Gallery of Art, Acc. no. 06.274; information kindly provided by Marianna S. Simpson, Curator, Freer Gallery of Art/Arthur M. Sackler Gallery, Washington DC, in her letter of 3 November 1992).
2. The sewing terminology is based partly on the proposals put forward by Spitzmeuller (1982–3) and extended by Palmer Eldridge (1993), attempting to describe stitches in terms of the thread movement, and partly on

the Dutch systematic vocabulary of Gnirrep, Gumbert and Szirmai (1992), which distinguishes between short stitches, where active joining of elements takes place, and long stitches, which merely carry the thread from one sewing station to the next. The overall array of the stitches as visible on the spine is termed the spine pattern and the assembly of the stitches in the centrefolds of the quires the fold pattern.

3. In the past the terms 'spine' and 'back' were often used indiscriminately as synonyms to designate various parts of a binding. In analogy to the vertebrate anatomy, where the spine is inside and the back outside the body, the term 'spine' is used in this book to refer to the surface of the bookblock and anything closely related to it (spine pattern, spine lining, etc.); the term 'back' refers to the exterior of the binding, notably the covering.
4. Through the courtesy of Mr William Voelkle of the Pierpont Morgan Library, I was allowed to examine briefly the bindings of the Glazier codex and PML M 910 in February 1992. The textblock of the latter is too damaged to be opened, so that the fold pattern remains unknown. The sewing of the Glazier codex has partly disintegrated: only a few vestiges of link stitches are still on the spine, encrusted with adhesive; in the centrefolds the thin thread is broken. As the pieces of thread have been disturbed from their original position, it cannot be determined whether single or double sewing thread was used.
5. Quecke (1984 p. 11) is cautious: '*Ob für die Heftung [. . .] letztlich ein oder zwei Fäden verwendet worden sind, kann ich nicht mehr feststellen.*'; but to me several of his illustrations clearly show the use of double thread.
6. Having read Lamacraft's 1939 article I worked out this sewing pattern as the most probable one, which in fact corresponds to Petersen's proposal (1948 fig. 14B); another, but less likely, suggestion was offered by Greenfield (van Regemorter 1992 p. 130).
7. This is one of the earliest instances of the use of coarse cloth as spine lining, which became generally employed as part of the hinging system on later Coptic and Islamic codices.. It supports the assumption that the Freer Gospels has been rebound, as evidenced by certain other repairs and suggested by Morey (1912 p. IX).
8. The superb state of preservation of the Glazier codex, notably of its leather, gave rise to some doubts about the authenticity of the binding (Needham 1979 pp. 9, 11). However, there are numerous examples of ancient leather objects form Egypt and the Near East that are much older than the Glazier binding and preserved in perfect condition. They testify to a very high standard in leather manufacture in antiquity in that region, as documented by Forbes (1957), Bravo and Trupke (1970) and Lucas and Harris (1989 pp. 33–8), and reviewed with reference to bookbinding by Bosch and Petherbridge (1981 pp. 58–64). The clinically clean state of the binding could suggest that it had been 'restored' before it appeared on the market. Yet, it is reassuring to learn that C^{14} dating of a piece of leather of the wrapping band has indicated an age range of AD 420 to 598 (Sharpe 1996a).
9. '*Dass derart vornehm ausgestattete Bücher auch kostbare Einbände besessen haben müssen, steht ausser jedem Zweifel*', declares Ibscher (1937 p. 15). Unfortunately, such sweeping and unscientific surmises *e silentio* are still surviving in modern literature on bookbindings.
10. Nag Hammadi Codex I, also known as Codex Jung, was temporarily in the possession of the Zurich Jung Institute. Its contents are now kept in the Cairo Coptic Museum and its covers at Claremont California Institute for Antiquity and Christianity (Robinson 1984).

Chapter 3 Late Coptic codices

3.1 INTRODUCTION

The codices described in this chapter date to the period from the seventh to the eleventh centuries, when the Coptic Church, already alienated from Byzantium, suffered increasing oppression by the Arab rule. Initially tolerant towards the Copts, the new rulers later repeatedly subjected them to severe persecution: not surprisingly, some of their scriptures were found hidden in the Egyptian soil, often on sites of ancient monasteries or rubbish dumps. These circumstances explain the damaged state of many of the finds, often aggravated by neglect and carelessness on the part of the finders. Usually these codices aroused interest mainly because of the texts; their bindings were considered noteworthy only if decorated, but in fact some of the 85 Coptic 'bindings' listed by G.D. Hobson (1938–9) had rendered nothing but scraps of detached covers.

Most of the finds were made in the 1890s (Upper Egypt, the area of Sohag, Esna and Edfu) and in 1910 (Monastery of St Michael of the Desert near Hamuli, in the Fayum region). The latter was the more important find as many of the more than 50 codices (dated from AD 827 to 999) were still in their original binding. Religious texts mostly in the Sahidic dialect prevailed (lives of Saints, homilies, synaxaries, parts of the Old and New Testaments and apocryphal works); the majority was written on parchment, some on papyrus and a few on paper. They found their way into major collections like those in Vienna, Berlin, London and Cairo, but for the most part went into the Pierpont Morgan Library in New York. Unfortunately most of these bindings were separated from their contents without any particulars of their construction being recorded.[1]

As no detailed study of the structure of bindings has been made public yet, the present attempt to gather scattered pieces of information will inevitably contain lacunae and conjectures. The main source of information concerning the bindings of the corpus of the Hamuli codices goes back to Father T.C. Petersen, who studied the *c.* 50 detached covers in the Pierpont Morgan Library and recorded his detailed observations in his unpublished typescript (Petersen 1948), which also holds data on another 50 Coptic bindings or fragments in other collections. In a fundamental article of 1954 Petersen published at least some of his data on this material as well as on Islamic bindings. Some technical details of the Hamuli codices are given by Miner (1957 pp. 15–18), Needham (1979 pp. 12–23) and Depuydt (1993). Little pieces of information on covers in the Berlin collections are to be found in articles of Ibscher (1911) and Adam (1912b; 1914; 1923–4); data on material in Vienna are given by Gottlieb (1910), on material in the British Library by D. Cockerell (1932) and G.D. Hobson (1939). The following description is mainly based on these data, supplemented with some of my own observations.[2]

3.2 SEWING

There is little doubt that the sewing was based on the link-stitch technique, although hardly any of the codices have preserved their original sewing. The evidence is, in fact, circumstantial: sewing holes and ends of sewing thread in centrefolds, remnants of thread in the spine area of detached covers, impressions in the spine covering and the absence of vestiges of bands or sewing supports familiar from later periods.[3] Petersen (1948; 1954) suggested a number of possible sewings (one of which is reproduced in Figure 3.1) that were all based on vestiges of threads which had remained adhering to the covers and are therefore conjectural. One of them, showing sewing thread between the sewing stations both inside and outside the quire (Petersen 1948 fig. 9), is most likely a misinterpretation of a sketch by Adam (1914 p. 92) of a late medieval binding from Athos. The extended link stitch is not mentioned explicitly by Petersen, but it is illustrated for the endband sewing (see Figure 3.7[a]) and in one instance for a chain across the spine (Petersen 1948 fig. 36c). Most of Petersen's drawings show the link stitch in β configuration; whether or not this rests on solid evidence remains questionable.

The majority (40) of the Hamuli codices has four sewing stations; in six cases there are three, in four cases five. The average height of the covers is 331 mm (*s.d.* 57.5, range 275 to 420 mm); there is no evident correlation between height and the number of sewing stations ($r = 0.48$). The sewing stations (measured at the attachment site on the cover) are evenly positioned, except for the outermost sewing stations which can be smaller (Figure 3.2).[4]

In addition to the sewing holes at the sewing stations some extra holes have been noted on a number of the codices; Petersen (1948) interprets them as evidence of a preliminary stitching by the scribe to keep the sheets of the quires together prior to binding. He substantiates his conclusion with similar quire tacketing preserved in a privately owned

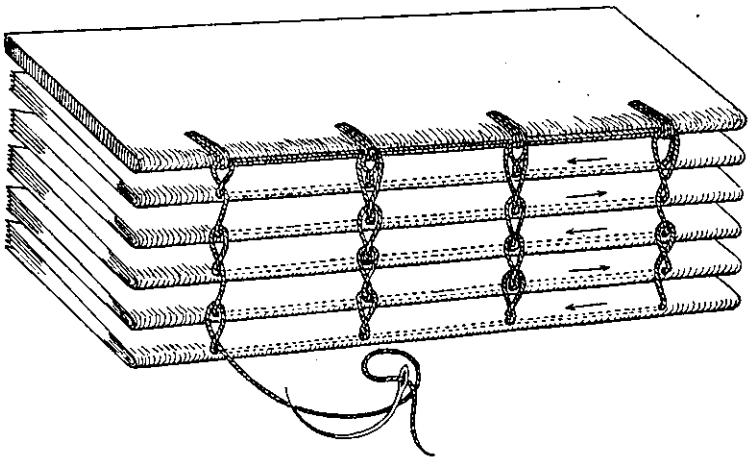

Figure 3.1 Sewing of the Coptic Lectionary PML M 634 (s. ix, 320 × 270 mm, from Petersen 1954 p. 43, fig. 4). Note that the bookblock is shown upside down since sewing starts with the upper board lying on the working surface; the link stitch shows the β configuration.

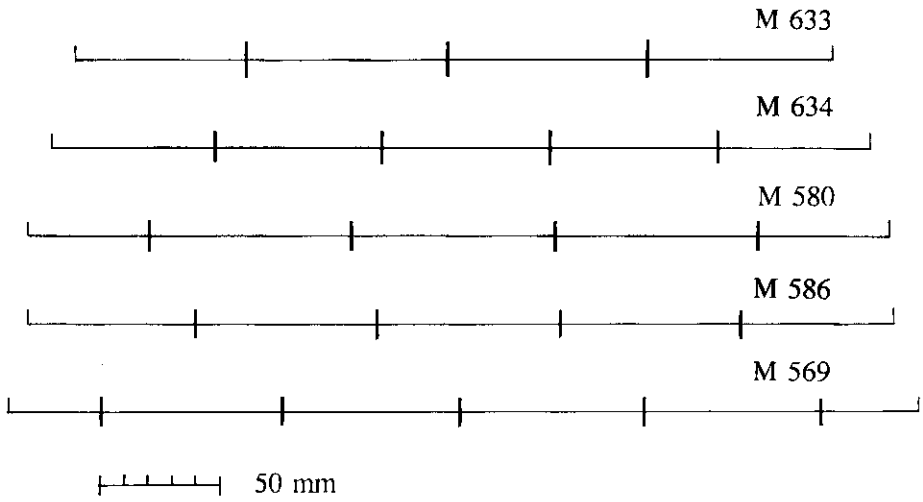

Figure 3.2 Disposition of the sewing stations of five Hamuli codices (PML).

Coptic codex still in its original binding (Petersen 1948 Part IV, no. 73; 338 × 245 mm, 10 parchment quires), where each quire had a tacket of a rolled strip of used parchment, passing through holes in the centrefold at a distance of 35 to 40 mm and tied with a simple knot on the spinefold.[5] Only because the binder did not care to remove the tackets when sewing the quires, a practice frequently encountered in later periods, are we fortunate to know of such quire tacketing.

The nature of the sewing thread has not received much attention: Adam (1923–4 p. 23) casually mentions remnants of heavy and tightly twisted flax [?] in an unspecified Berlin fragment. The sewing thread of several of the Hamuli codices (both S- and Z-twist) has a diameter of *c.* 1 mm. The thread in Leiden RMO MS Anast. 9,[6] a seventh-century papyrus codex (215 × 145 mm, three sewing stations), is of vegetable material and has a diameter of about 1.2 mm and a four-ply Z-twist. The centrefold is protected by a full-length guard of parchment as often employed in papyrus codices (Figure 3.3). Such inner guards have also been observed in fragments of Coptic bindings in the Berlin collections by Adam (1923–4).

3.3 BOARDS AND THEIR ATTACHMENT

The covers of the codices appear to be connected to the bookblock by means of hinging loops, made of the same thread as used for sewing and wound several times around the spine edge of the board through holes *c.* 20–30 mm from the edge, as shown in Petersen's drawing (see Figure 3.1). There are several ways of constructing such a set of hinging loops; three of them are shown in Figure 3.4. In [a], the thread is carried from one set of holes to the next along the board edge, in [b], the connecting thread lies between the set of holes, while in [c], the thread yields an oblique or zigzag pattern. The roughness with which

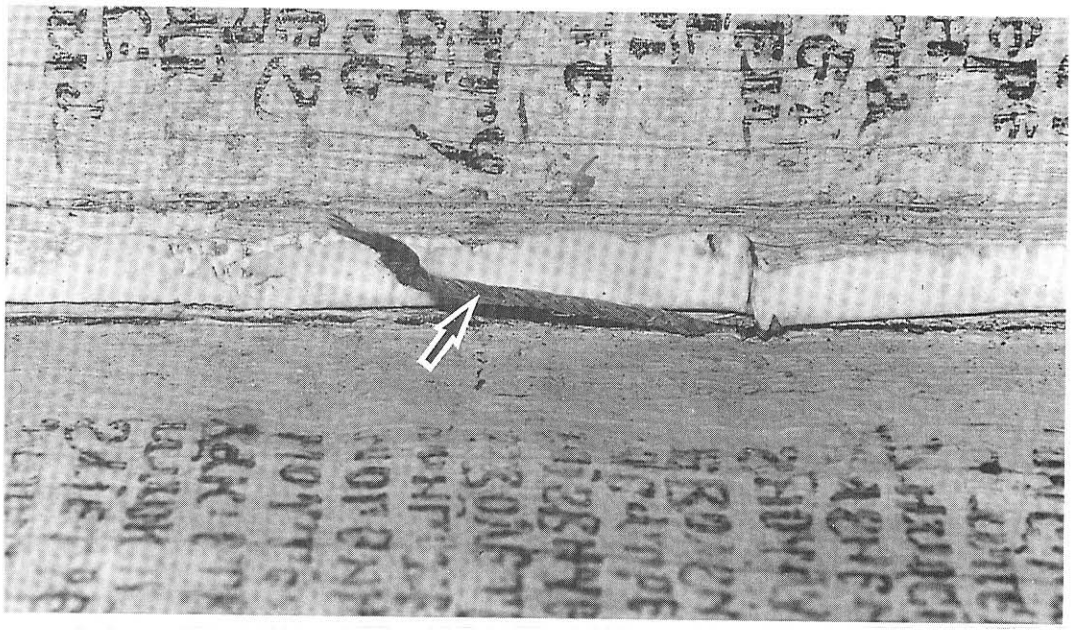

Figure 3.3 Sewing thread (arrow) partly protruding from the parchment guard in the centrefold of the second quire (pp. 20–1) of the seventh-century Leiden RMO MS Anast. 9.

the boards of the Hamuli codices were separated from their contents did not allow Petersen either to decide in each case which method was used, or to be sure whether fitting the boards with the hinging loops was done before or during sewing. In the first case, the prepared hinging loops in the board serve as anchors to make the links when sewing the first quire; in the second case, one starts with making the hinging loops in the board opposite the first sewing station, enters the quire from there with the thread, exits at the second sewing station, makes the hinging loop in the board, re-enters and proceeds to the next sewing station, etc. Differences in the thread structure of the hinges and sewing distinguishes one operation from the other.

Virtually all boards of late Coptic codices are made of papyrus. A number of sheets are pasted together and pressed into a solid substance; mostly reused sheets of papyrus were employed, only occasionally new sheets (*c.* 20 of the Hamuli codices had boards made from old manuscripts). Yet Petersen (1948 p. 46) mentions boards of thick strips or parts of papyrus pith or peelings of the outer skin of the stalk; other boards seem to contain flax straw, clippings of used parchment, scraps of linen or leather. Adam (1923–4 pp. 21, 63) found such materials woven into a lattice and further suggested that moulds had been used to make boards. Laminated parchment boards have been recorded in one case (see note 5). Usually the boards have a thickness of 6 to 18 mm and are covered after hinging (Figure 3.5[a]).

Double boards were found on PML M 569, M 570, M 574, M 575 and M 672d (Petersen 1948 pp. 59–60, fig. 35), P. Berol. 14018 (Adam 1923–4 p. 32) and BL Or. 5000 (D. Cockerell 1932 p. 10). Usually the inner boards are attached to the bookblock by

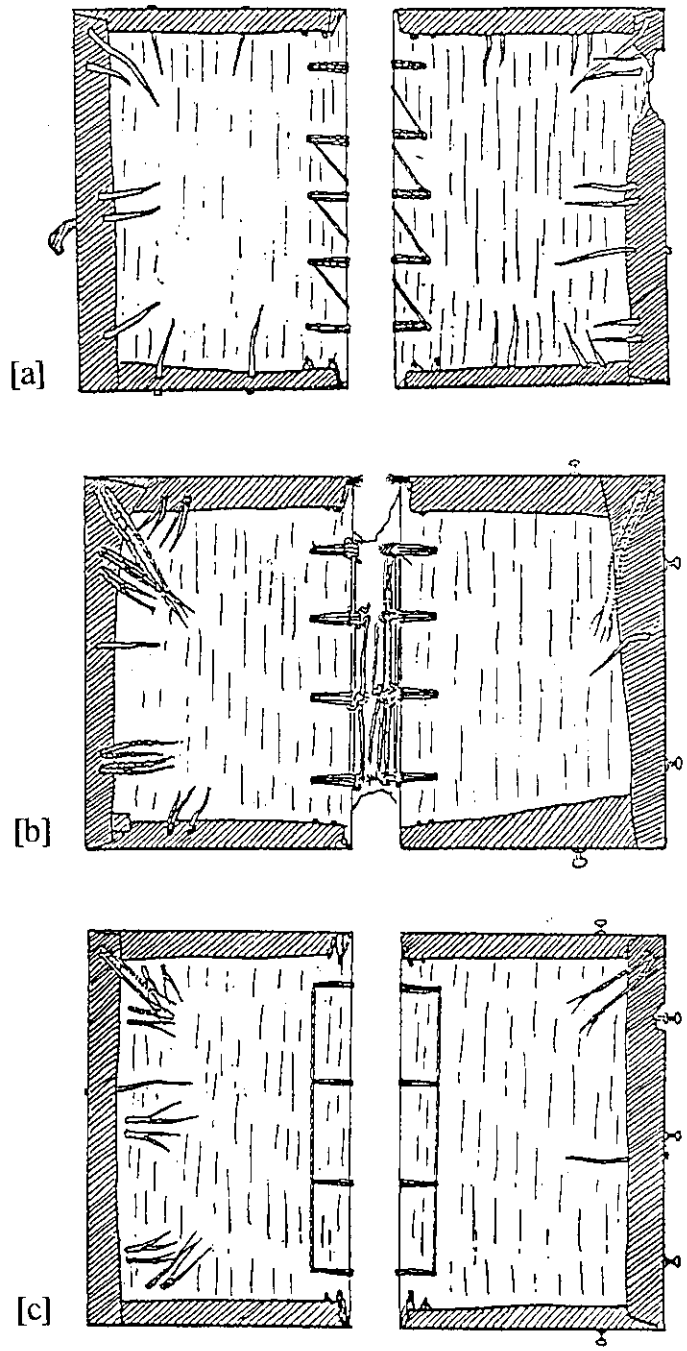

Figure 3.4 Various types of hinging loops on detached covers of Hamuli codices (PML): [a], M 634, s. ix/x, 320 × 270 mm; [b], M 597, AD 914, 350 × 268 mm; [c], M 588, AD 842, 348 × 285 mm (from Petersen 1948 figs 25–7).

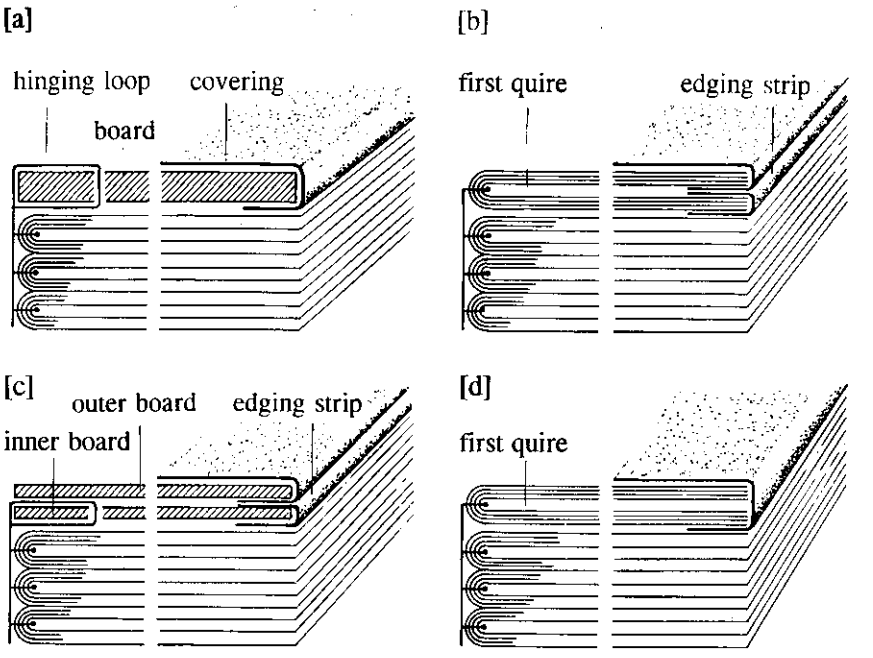

Figure 3.5 Various methods of board construction and shaping of the board edges. In [a] and [b], separately prepared pasteboard is employed and attached to the bookblock with hinging loops; in [b], a distinct grooved edge is produced by joining two boards. In [c] and [d], the outer quire, sewn with the bookblock, is used to produce the board by pasting together its leaves; a groove results when the edges of the two halves of the folded board are covered separately, [c].

hinging loops (described above) and their edges covered all round with an edging strip of leather; the outer boards are covered with leather and stuck to the outer face of the inner boards, [b]. The make-up of BL Or. 5000 is different: the sheets of papyrus for the boards were made up to twice the size of the book, folded like a quire and sewn through the fold, hence the attachment forms an integral part of the sewing, [c].[7] If the edges of either part of a double board are covered separately, constructions [b] and [c] cannot easily be distinguished, as both have distinct grooved edges; if their edges are trimmed and covered as one unit, the board edges of [a] and [d] look identical. Construction [d] could account for the appearance of the heavy (*c.* 18 mm thick) papyrus boards of Leiden RMO MS Anast. 9, where I could not detect any traces of hinging loops. This latter system is also documented in at least one of the early Coptic codices (see section 2.6, Figure 2.10[b]).

The grooved edges on Coptic codices with double boards were copied on Byzantine bindings and even retained on their later 'alla greca' imitations (see section 6.11). The original reason for the covering in two steps is not quite clear. Petersen (1948 p. 76) assumes that decoration of the covering involved such heavy pressing or hammering of stamps into the dampened leather that it could have harmed the already bound codex; this would have been avoided by decorating the covering on the (relatively thin) outer boards

separately from the book and before joining them to the inner boards. Petersen found his idea supported by dislocated tooled lines as well as lines continuing on the turn-ins.

3.4 SPINE LINING AND EDGE TRIMMING

There is sound evidence that the spine of the bookblock with its boards attached was consolidated by a lining of coarse cloth, blue or blue-green but often plain, extending *c.* 40 to 80 mm onto the outer face of the boards. It was affixed with adhesive, probably a kind of starch paste. Adam (1923–4 p. 42) was impressed by the extraordinary adhesive power of the material used by the ancients, supposedly prepared from the bulbs of an asphodel species (*Liliacae*).[8] Petersen's claim (1948 p. 55) of not having found any evidence of the use of an adhesive on the spines of the Hamuli codices should be taken with some reservation: the covers he studied had already been detached and the spinefolds probably cleaned of any adhesive residues.

Another reason to stabilize the spine with a lining could have been to obtain smooth edges on trimming. If the boards, falling shorter than the bookblock, were already attached, their edges could have served as a guide for the trimming tool. Alternatively, the edges of bookblock and board might have been cut jointly. In either case bookblock and boards are cut flush. In order to avoid damage to the sewing, it was imperative to keep the outermost sewing stations at a safe distance from the edges. Yet, setting back the outermost stations from the head and tail leaves these most vulnerable regions without support from the sewing. This weakness can be counterbalanced with the supplementary sewing of endbands.

The above inferences are supported by little actual evidence, as obviously the dismantling of a codex destroys any characteristics of the edges of the bookblock and boards.

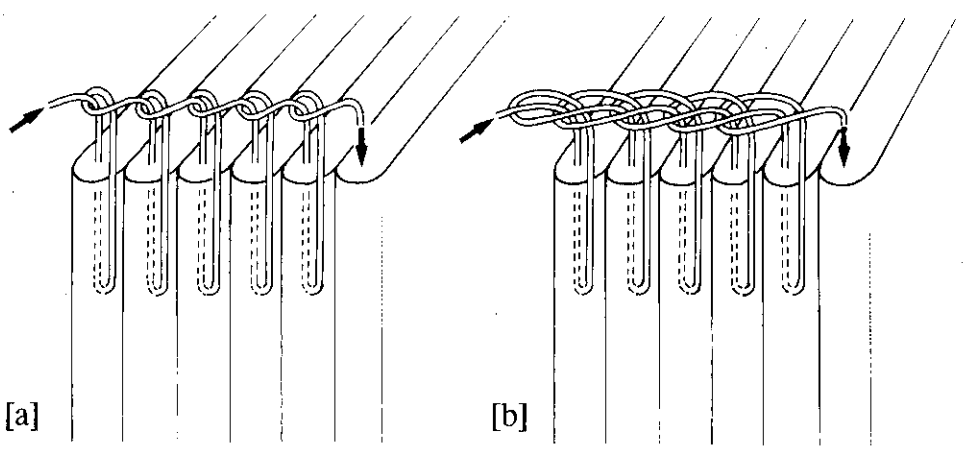

Figure 3.6 Diagram of Coptic endband sewing: [a], with simple link stitch; [b], with extended (two-step) link stitch.

The only instance of edge decoration was deduced by Budge from 'traces of scroll-ornaments in ink' on BL Or. 5000 (in Crum 1905 p. 393); evidently, a smooth surface would be a prerequisite of any edge decoration.

3.5 ENDBANDS

No endband of the codices from this period has survived intact, but remnants suggest that endbands were an integral part of the late Coptic binding. The most frequent endband sewing seems to be a variant of the link stitch; the basic principles of the thread movement are shown in Figure 3.6. On the basis of vestiges in about 20 of the detached Hamuli covers, Petersen (1948 pp. 61–2) reconstructed a type of endband in which the sewing is carried out after lining the spine with cloth; the beginning and end of the endband sewing are anchored at the head and tail of the boards close to the spine (Figure 3.7[a]). Similar endband remnants have been preserved on fragments of several other Coptic covers, such as ÖNB Papyrussammlung Inv. no. DB–1; a step-by-step description of this type of endband is given by Greenfield and Hille (1986 pp. 27–33).

Petersen (1948 p. 63) observed another type of endband on the covers of the Hamuli codices PML M 586, M 590 and M 599 (Figure 3.7[b]). He found on the corners of the boards

> stumps of two heavy cords (2.5 mm thick) which had been sewed down tightly and which probably, before they were broken, extended across the back to serve as guides and supports for platting of the headbands. Such cords, used as a base for the headbanding were known also to early Syrian and Greek binders, and the threads used by them for the tying-down and platting of the headbands were frequently red and green.

Petersen also mentions an analogy with the Islamic endband, and obviously has in mind the woven type of byzantine endband (see section 5.4, Figure 5.4 and section 6.7, Figures 6.12

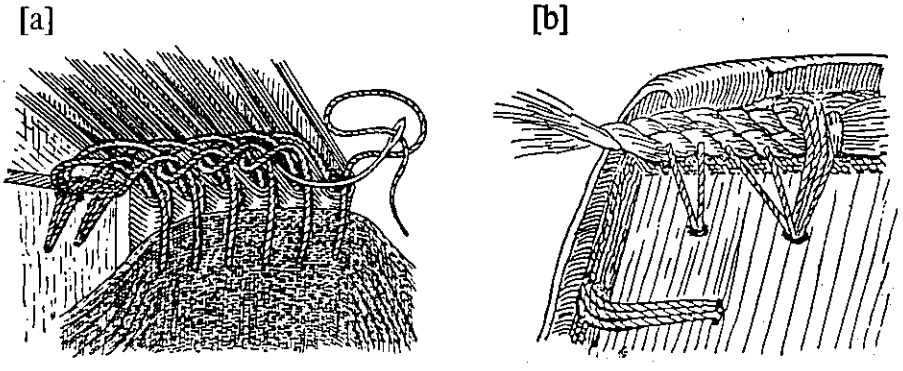

Figure 3.7 Two types of endbands on the Hamuli codices; [a], two-step link-stitch endband, anchored in the board and tied down through the cloth lining (from Petersen 1954 fig. 22); [b], endband cord anchored by thread in lower board (PML M 599, from Petersen 1948 fig. 18A).

and 6.13). It should finally be mentioned that the binding of BL Or. 5000 must have had some sort of endband, but the relevant passage by D. Cockerell (1932 p. 10) 'and there is a simple headband' does not give any information.

3.6 COVERING

The leather used on the Hamuli codices was often goatskin of a red-brown variety (see Chapter 1, note 4), probably of vegetable tannage. The turn-ins are slightly irregular, their width ranging from 10 to 45 mm; the corners are overlapping, with the front turn-in always on top. At the spine the leather is turned in on itself or, as in the case of PML M 590, over a core of thin cord (Petersen 1948 p. 63). In the case of double boards, the turn-ins of the outer boards are continuous, the inner boards have an edging strip all around, omitting the endband regions.

Whittawed goatskin and sheepskin were also available, sometimes with bright red staining of the surface layer only. White, coloured or gilded parchment was used for various decorations mastered by the Coptic binders. Their techniques included blind tooling, probably achieved by pressing unheated stamps into the dampened leather (concentric geometrical or animal figures) or drawing parallel lines with a blunt tool. They also cut out small

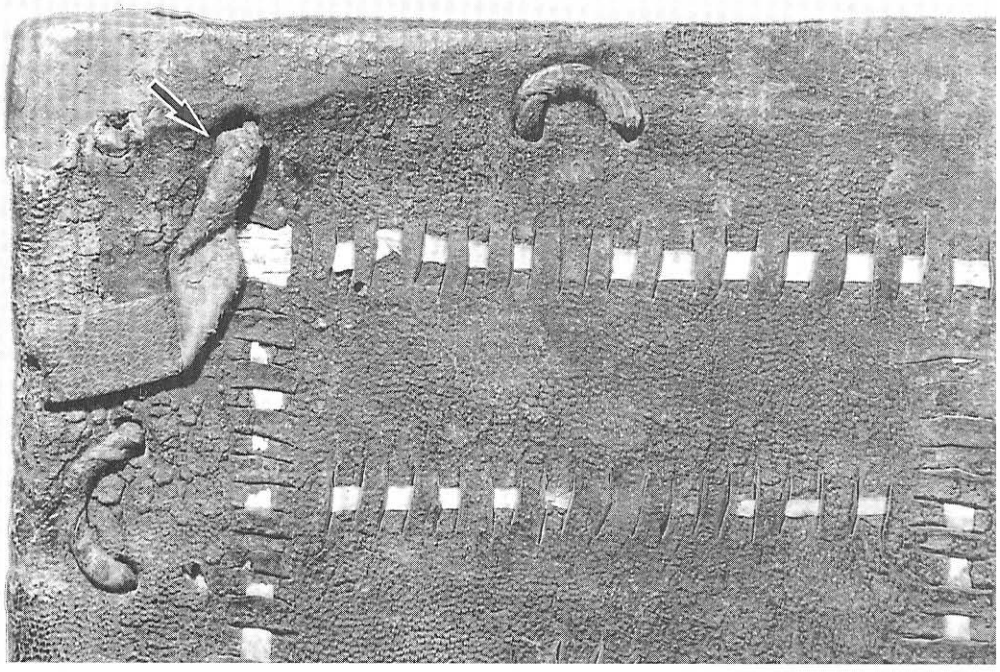

Figure 3.8 Upper part of the lower cover of Leiden RMO MS Anast. 9. A running stitch of parchment lacing is the only decoration; two loops are parts of the fastenings (toggles not preserved); the leather thong in the corner (arrow) is probably a remnant of a bookmarker.

areas of the covering, underlaid them with coloured or gilded material or inlaid them with leathers of different colour. Threading parchment or leather lacing through closely spaced slits was an ornamental variant of the running stitch (Figure 3.8), as well as a technique for joining pieces of leather. Most elaborate was the tracery work, where cut-out panels of leather were sewn to a gilded leather ground; the finest examples of this decoration are PML M 569 and ÖNB Papyrussammlung Inv. no. 34. Obviously such intricate decoration had to be undertaken before attaching the boards. For further details of decorative aspects see Gottlieb (1910), Adam (1912b; 1923–4), Loubier (1926), Arnold and Grohmann (1929), D. Cockerell (1932), G.D. Hobson (1939), Petersen (1954), Miner (1957), Ettinghausen (1959), Needham (1979) and others.

3.7 FASTENINGS AND OTHER APPENDAGES

Two types of fastenings were used. One type is entirely made of leather and comprises a thong with a toggle that is fastened at the front edge of the upper cover and a short loop in the corresponding position on the lower cover. The loops are of slightly twisted or tubular pieces of leather, drawn through two holes *c.* 20 to 40 mm apart and *c.* 20 to 30 mm away from the edge of the cover (see Figure 3.8); their flat ends are stuck down on the inner face of the cover. About 20 of the Hamuli codices have retained vestiges of loops, or even intact loops; usually two or three at the front edge and one each at the head and tail. Several other codices, for example Leiden RMO MS Anast. 9, were equipped with such toggle and loop fastenings. None of the codices mentioned above have preserved the toggle: the earliest example seems to be a small thirteenth-century Coptic prayer book (PML M 670–1), illustrated by Petersen (1954 figs 34, 35) next to strikingly similar fastenings on an eighteenth-century Coptic prayer book. Toggles are little fastening devices that had been widely used on ancient Egyptian footwear (Frauberger 1896) as well as on Western medieval shoes (Grew and de Neergaard 1988). Their basic construction is shown in Figure 3.9.

The other type of fastening consists of a peg fixed to the edge of the lower cover and a kind of strap made of a couple of slit-braid strands attached to the upper cover (for terminology of leather braiding see Grant 1972). Usually one or two such fastenings are at the head and tail, with three at the front edge. About 20 of the Hamuli codices have preserved one or more pegs and show vestiges of slit-braid strands. Remnants of an ivory and

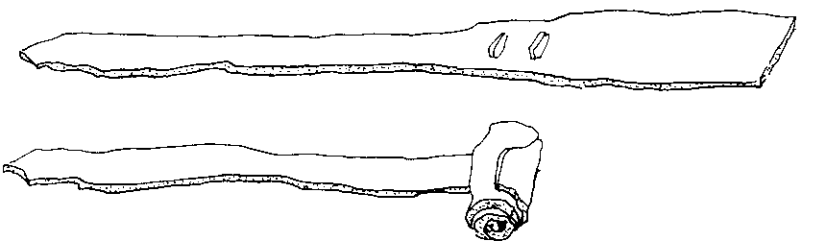

Figure 3.9 Construction of a toggle from a strip of leather.

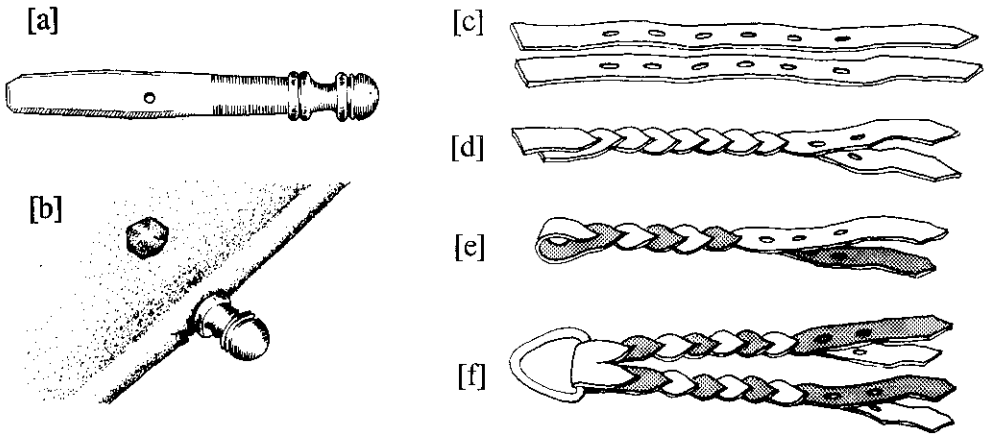

Figure 3.10 Peg and strap fastening: [a], sketch of a loose bone peg (PML M 577, AD 895, 328 × 257 mm); [b], peg secured with a rivet in the cover edge (PML M 597, AD 914, 350 × 268 mm); [c] and [d], a slit braid made from two strips of leather; [e], a slit braid made from a single strip of leather, in which case the grain and flesh surface alternate; [f], a bipartite slit braid on a metal ring to hook around the peg.

an iron peg can be seen on BL Or. 5597 and BL Or. 6081 respectively (Budge 1915 pp. XLI and XLVI). The pegs of the Hamuli codices are of bronze or bone. They have a finely turned head protruding from the board edge by *c.* 10 to 15 mm and a flattened shaft inserted into the board; a bronze or iron rivet nailed through a hole in the shaft secures the peg (Figure 3.10[a] and [b]).

The structure of the counterpart of this fastening is not quite clear, since not a single one seems to have survived intact. What has remained are slips stuck down on the inner face of the upper cover, which Petersen (1948 p. 84) describes as 'braided of double or triple strands of leather, or platting of two strands with punched holes'.[9] The construction of slit-braid straps is shown in Figure 3.10[c] to [f] and vestiges of such straps are shown in Figure 3.4. Whether the leather loop was slung over the peg as such or by means of kind of metal ring remains a matter for conjecture, as no such rings are recorded to have been found with the Hamuli or any other Coptic codices from this period; still, because of the similarity with late medieval byzantine bindings it is very likely that they were used (see section 6.9, Figure 6.15). The only, but rather doubtful, instance of metal rings on a Coptic fastening is represented by Petersen (1954 fig. 6) in a drawing of a purported reconstruction by Ibscher.[10]

A single example of another type of fastening, the workings of which are still obscure, is seen on BL Or. 5000 and illustrated by Petersen (1954 fig. 30). It comprises two single leather thongs at the top and bottom and three on the front edge of the upper cover and three simple metal rings anchored with short leather straps in the corresponding places on the front edge of the lower cover.

Finally, some appendages should be mentioned: bookmarkers that are appended with single- or slit-braid straps to the outer corner of one or both covers; remnants of which are still preserved on about 14 of the Hamuli codices and likely to be of the same kind as

those on various early Chester Beatty codices (see section 2.5, Figure 2.7). A loose bookmarker has been kept with PML M 574, but in a few other cases only impressions on the textblock indicate their former existence (Petersen 1948 p. 90). Vestiges of such bookmarkers have also been found on other codices, for example on Leiden RMO MS Anast. 9 (see Figure 3.8). Another kind of appendage in the form of leather tabs centred at the front edge of the upper cover is described by Petersen (1948 p. 92) for PML M 588 and is suggested to have served as a means of lifting the cover. Vestiges of leather ends apparently giving evidence of such tabs have been recorded on the inner face of the upper covers of about a dozen of the Hamuli codices. Page markers of leather were also found on several of the Hamuli codices (Petersen 1948 p. 94).

NOTES

1. The fate of this precious corpus of about 50 codices is a tragic example of an irrecoverable loss due to the disdain for binding structure in those days. Purchased by J. Pierpont Morgan in 1911, the whole collection was sent to the Vatican Library for restoration in 1912. The then Prefect of the Vatican Library Dr F. Ehrle, assisted by Prof. H. Hyvernat (in charge of the facsimile edition), separated all covers from their contents with his desk scissors without thinking it necessary to record anything of the sewing or any other technical detail. The detached covers were eventually treated and returned to New York in 1929. Alas, the treatment was inadequate: several boxes arrived containing live beetles which had eaten much of what had remained of the covers. Kiln-heating was to complete the torment of these priceless treasures, which had survived a millennium in pristine state (from data by Petersen 1948, Tisserant 1950 and Needham 1979 p. 13).
2. I inspected the covers of several Coptic codices in the British Library (BL Or. 5000, Or. 5001, Or. 6801, Or. 7027 and Or. 7597) in August 1986, some covers and their fragments at ÖNB Papyrussammlung in November 1991 and I made a detailed study of MS Anast. 9 of Leiden RMO in December 1991. I had the privilege of having been able to study some of the less fragile Hamuli covers in New York PML, (M 569, M 574, M 580, M 588, M 590 and M 597) in February 1992.
3. Sewing on supports is so self-evident to the twentieth-century binder that other methods of sewing have seemed almost inconceivable; thus, frequently, impressions observed on the interior of the spine covering of Coptic covers have been interpreted as evidence of thongs or cords. Such false conclusions were drawn by Gottlieb (1910 cols. 33–4; 1928 p. 422) on Vienna ÖNB Papyrussammlung Inv. no. 34; similarly, on the covers of BL Or. 5000 D. Cockerell (1932 p. 10) observed 'depressions on the inside of the leather of the spine caused by the bands', which led him to conclude that 'the sewing seems to have been done on cords in essentially the same way as used in Europe centuries later'.
4. Eight to 17 sewing holes were counted by Budge (1910 p. XIII) on BL Or. 5001 (height 320 mm); these figures rather indicate old rebindings, as further suggested by, for example, mended leaves.
5. According to Petersen (1948 p. 18), this codex of Homilies of Apa Shenoute (AD 999) was found in Harit, Faiyum, in 1916; its binding was intact and unrestored. Its boards were pasted together from *c.* 20 leaves of used parchment; it was covered with brown leather and equipped with its original endbands. It was owned in 1920 by A. Imbert in Paris, later by Professor R. Riefstahl who sold it in 1931 to Sambon in Paris; in 1949 it got into the possession of the Cairo dealer Albert Eid & Co.
6. This seventh/eighth-century papyrus codex in its original binding was part of the collection of Giovanni d'Anastasi, purchased in 1828 by the Leiden Rijksmuseum van Oudheden. It is supposed to originate from Thebes and consists of three quires; the main contents are prayers, some magic and apocryphal texts (correspondence of Jesus and Abgar). It measures 215 × 145 × 52 mm and has heavy papyrus boards (17–18 mm) covered with dark-brown goatskin. Restored in the nineteenth century, it has still retained the single sewing thread (three sewing stations) and vestiges of the endband sewing in the centrefolds, but the link stitches on the spine and the actual endbands are lost. Pleyte and Boeser (1897 pp. 441–79) first published on it; their illustration was redrawn by Petersen (1954 fig. 33). Recently the codex has been described briefly by Raven (1982 pp. 82–3).

7. This double board of BL Or. 5000 has been misinterpreted by Budge (in Crum 1905 p. 393): 'The leathern binding, though ancient, is not original; an earlier binding can be discerned below it'.
8. The use of asphodel and wheat paste in bookbinding in the Near East is discussed by Karabacek (1887 p. 139); for early Arabic sources on the use of adhesives in bookbinding see Bosch and Petherbridge (1981 pp. 50–1), on adhesives in ancient Egypt see Lucas and Harris (1989 pp. 1–9).
9. Tri-partite straps and heart-shaped bosses are represented in wall paintings in the Monastery of Apa Jeremiah at Saqqara, founded in the fifth century. Yet, there is every likelihood that the wall paintings date from several centuries later (Van Moorsel and Huijbers 1981).
10. The so-called reconstruction of 'Ibscher's Coptic binding' appears to be a myth. The caption of Petersen's illustration (1954 fig. 6) specifies: '(*c.* 440 × 330 mm), eighth to tenth century, Offenbach, Leder-Museum'. Correspondence with the 'Deutsches Ledermuseum', Offenbach/Main, Germany (letter of Dr R. Nenno, 15 October 1991) resolved that no such reconstruction is known there; however, a single Coptic cover that indeed had belonged to Hugo Ibscher is in the possession of the Museum (Inv. no. 4114, *c.* 400 × 320 mm). It was published by Adam (1923–4 p. 84) and by Arnold and Grohmann (1929 pp. 36–8, fig. 19a) and seemed to exhibit a remarkable asymmetry in decoration. During restoration work by Schmitzer (1970) this turned out to have been the result of leather shrinkage. The detached cover (contents unknown) had a side wall like some ninth-century Islamic box bindings (see section 5.2). Adam (1923–4 p. 78) says about the wall that '*nur noch eine ist vorhanden*' but cannot detect any traces of fastenings. Yet he argues that '*Von anderen Sammlungsgegenständen wissen wir, dass die griechischen Bände jener Zeit [. . .] mit von vorn nach hinten schliessenden Metallösen an geflochtenen Riémchen verschlossen wurden*'. To support his contention Adam (1923–4 p. 78, figs 68, 69) provides drawings of straps with metal rings, obviously copied from late medieval Greek bindings and, furthermore, pictures a 'Coptic binding' with four such fastenings (p. 32). Thus eventually and entirely on evidence *e silentio* an imaginary box binding was constructed; imagination for which the pioneers should be forgiven.

Chapter 4 The Ethiopian codex

4.1 INTRODUCTION

Christianity reached Ethiopia around the fourth century, probably through Syrian missionaries. Contacts were maintained with the Coptic Church and with Byzantium during the following centuries, but the Arab conquest of Egypt isolated Ethiopia from the rest of Christendom for at least six or seven hundred years. It was not before the sixteenth century that Portuguese and Italian missionaries began to return from that remote region with antiquities and ancient books. These were prayer books, gospels, hymns, lives of martyrs or miracles of the Blessed Virgin Mary written on parchment in the Ghe'ez language, often embellished with bold miniatures in vivid colours and bound in a very simple codex form, which has in fact remained almost unchanged until the present day: it consists of link-stitch sewing, with the sewing thread anchored in the wooden boards; the spine of the bookblock and the boards may remain uncovered, but are more likely to be covered with leather. Their simple structure has often been equated with that of early Coptic codices, which would have meant that the Ethiopian binder had preserved the tradition of his craft for more than a millennium. Numerous Ethiopian manuscripts landed in large European libraries, the most significant collections being those of the British Library, the Bibliothèque Nationale in Paris, the Vatican Library and libraries in Berlin, Frankfort and Vienna (Budge 1928 p. 561). Most of these codices are of relatively late date: the usual (often vague) dating is from the sixteenth to the nineteenth centuries. Although the British Library claims to have the oldest example dating from the fifteenth century (BL Or. 719), the BNF in Paris (which owns the collection d'Abbadie) and the Vatican Library seem to hold earlier examples (Diringer 1953 p. 319).

A few pages in d'Abbadie's library catalogue of 1859 contain the first, lucid but brief description of Ethiopian binding structures; it was cited in detail by van Regemorter (1962). In the literature Ethiopian codices are mentioned only casually, sometimes as curiosities (Sichler 1925) or for comparison with other binding structures (D. Cockerell 1932; Petersen 1948; Powell and Waters 1969); short accounts are given by Juel-Jensen (1987) and Greenfield (1991), some technical details are presented by Bull (1987) and Bozzacchi (1995). The traditional production of Ethiopian manuscripts as still practised today is described by S. Cockerell (1977), Sergew (1981) and Juel-Jensen (1994). The essentials of these data are summarized below, augmented with my own observations.[1]

4.2 SEWING AND BOARD ATTACHMENT

The basic sewing of the Ethiopian codex is illustrated in Figure 4.1. Paired sewing stations are the rule: small codices (height 80 to 120 mm) usually have one pair, while larger codices usually have two or three (S. Cockerell 1977), but may have up to seven pairs (van Regemorter 1962). The binding operation begins with preparing the wooden boards, which receive holes to accommodate the thread [a]. In the case of sewing on one pair of sewing stations, the sewing thread enters in the first set of holes at sewing station A, leaving either end the same length, and makes the anchoring loop [b]; one end then enters the first quire at sewing station A and exits at sewing station B, where the thread is anchored in the board in the same fashion as at A. Next, both ends of the thread are needled and the actual sewing begins, following the same pattern as illustrated in Figure 2.1[i]: the two ends of the thread enter the quire at sewing station A and B respectively, pass each other in the centrefold, exit at the opposite sewing stations, make a link under the previous sewing and climb to the next quire. This process (Figure 4.1.[c]) is repeated until the last quire is reached; here the two ends of the thread exit to be anchored in the lower board in exactly the same way as in the upper board and re-enter the last quire, where they are ultimately knotted. All quires but the first and last reveal a fold pattern of two long stitches and a spine pattern of two chains; the first and last quire have three long stitches, the latter evidently with the final knot. Figure 4.2 shows the fold pattern and spine pattern when sewing on two pairs of sewing stations.[2]

The board attachment and sewing described above was generally assumed to be the sole and characteristic structure of the Ethiopian codex. Two recent brief papers indicate that matters are probably more complex. Bozzacchi's investigation (1995) into Ethiopian codices in Rome's Biblioteca Corsiniana yielded three variants of board attachment and sewing on paired sewing stations; the boards are furnished with the same sets of holes as

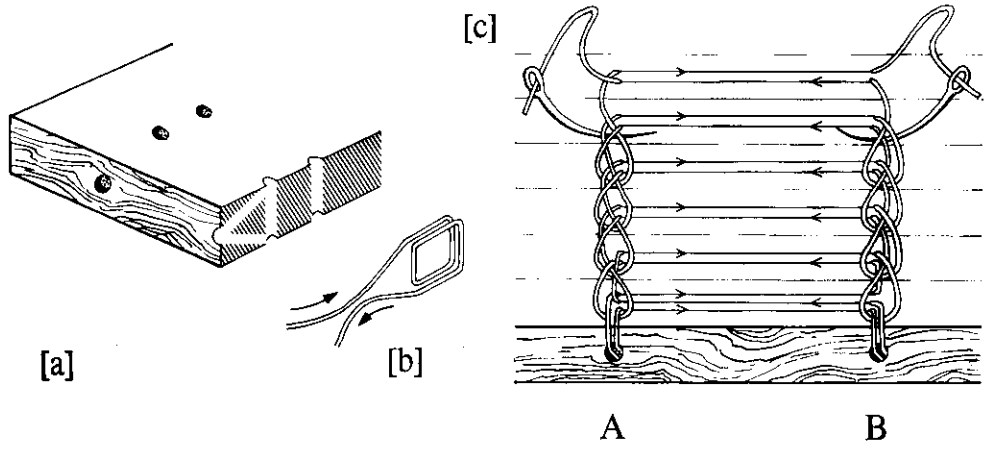

Figure 4.1 Board attachment and link-stitch sewing common to the Ethiopian codex: [a], disposition of holes in the board for anchoring the sewing thread; [b], anchoring loop of the sewing thread; [c] link-stitch sewing on a pair of sewing stations employing one piece of thread and two needles.

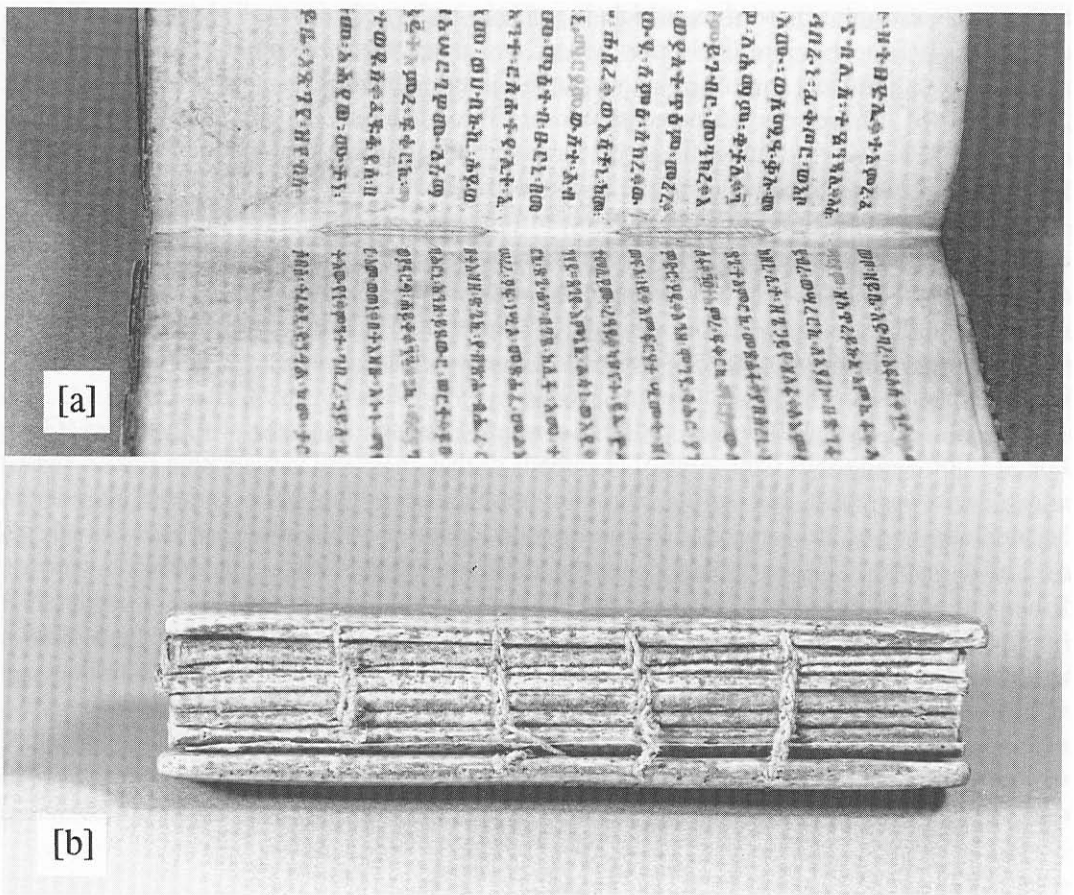

Figure 4.2 Ethiopian codex sewn on two pairs of sewing stations: [a], fold pattern with two long stitches between each pair of sewing stations; [b], spine pattern (Hymns and Prayers, s. xix, 155 × 112 × 36 mm, six quires; the author's collection).

described above, but the thread movement is different and in one instance even a second piece of thread is required. Bull (1987) reported on a type of board attachment of a manuscript in India Office (B6, London) where the sewing thread is anchored with a knot in an additional hole in the inner face of the board. These variants admittedly concern only a few examples and more evidence is needed to establish them as another standard technique. A rather complex sewing system on paired stations was proposed by Bartelt and Hammerschmidt (1976); it is a kind of 'reversed' link-stitching, rather unpractical and its authenticity is not supported by historical evidence.

Whereas the above variants employ sewing stations in pairs, Ethiopian bindings may also be sewn on multiple sewing stations. Petersen (1948 fig. 11c) provides an example of sewing with two lengths of thread at three sewing stations; he suggests that in a first step the sewing was confined to the outermost stations, while in a second step and with a second length of thread the sewing rendered the linking with the intermediate sewing station: a

truly time-consuming procedure which is unlikely to have been applied by any efficient craftsman. It appears more likely that one or two needles were used and the same result achieved by alternately omitting linkage at the intermediate station, as shown in Figure 2.4[a] and [b]. I have seen a nineteenth-century Ethiopian prayer book (Tübingen, private collection) sewn with a double thread on three stations, but due to the intact back covering I was unable to determine which of the above methods was used.

The sewing thread can be linen, cotton and, as maintained by many authors, catgut: the latter is already mentioned by d'Abbadie in his 1859 catalogue; Sichler (1925) recorded it in a fifteenth-century codex; twisted sinew is thought to be the sewing material of Ethiopian codices in the Berlin collections (Bartelt and Hammerschmidt 1976). On his visit to Ethiopia S. Cockerell (1977) witnessed the use of sheep or goat intestines in modern bindings, Sergew (1981 p. 24) mentions oxen gut.

Among several Ethiopian codices I studied, I noticed in at least two instances (Graz UB MS 2062 and ÖNB Cod. Aeth. 17) threads of two or several yarns with a final Z-twist, which were very stiff and brittle and thus susceptible to breaking at bending points. Incidentally, the broken sewing thread in the Glazier codex (see section 2.3) is seemingly of a similar nature. Under magnification a piece of thread from a nineteenth-century Ethiopian binding appeared to be coated with a transparent yellow material of considerable hardness. On extracting a thread fragment with aether-alcohol (a powerful solvent of fats and waxes) the two fibres easily separated into elementary fibrils, showing characteristics of vegetable material (unidentified). This pilot experiment awaits further confirmation but may suggest that the threads thought to be catgut are in fact textile material impregnated with a kind of wax or varnish. This would tally with the observations of Bozzacchi (1995) on threads being '*canapa ritorta molto cerata*'.[3]

4.3 BOARDS AND COVERING

In general, the wooden boards show signs of crude workmanship: their surface often carries score marks left behind by the adze, they are seldom exactly square and their edges are unbevelled. On larger books they often comprise two halves, joined by vegetable fibres, which may have also been employed for repairing broken boards. The lacing holes were possibly made with a glow awl (Sergew 1981 p. 24). The species of wood mentioned mostly are *wanza* (*Cordia*), *wäyra* (*Olea*) and cedarwood (*Cedrus*) (van Regemorter 1962; Sergew 1981 p. 24). The boards are usually flush with the bookblock; if any trimming was done, it had to be performed with the boards already attached; however, no score marks on the edges of the bookblock have been reported.

Most of the simple Ethiopian codices have remained uncovered. Sometimes the spine and about one third of the borads are covered and only the more luxurious codices are in full leather. The covering leather is mostly of goat or sheep hair of a red-brown variety, also characteristic of many of the Coptic codices. There are wide turn-ins, mitred at the corners, pasted down or joined by leather lacing. The inner face of the boards, left exposed by the turn-ins, is often inlaid with colourfully ornamented cloth (for textile paste-

downs see Pankhurst 1980; 1981). The leather covers and turn-ins are usually decorated with blind lines or simple ornamental stamps, frequently arranged around a central cross. According to D. Cockerell (1932 p. 15) 'it looks as if it might have been done cold on wet leather'.

4.4 ENDBANDS

As a rule, endbands are absent on codices without covering; leather-bound codices usually do have endbands, sewn on after covering. They consist of a slit braid (see Figure 3.10[c, d]) of two thongs *c.* 6 to 10 mm wide; they extend the spine by *c.* 40 to 60 mm on either side, the ends hanging freely between board and bookblock. The endbands are attached to the spine edge at the head and tail of the bookblock by stitching through the quires and the back covering; the stitches are discernible on the back (Figure 4.3). The thread for sewing on the endband often differs from the heavier one used for sewing the bookblock. The principle of the construction of these endbands is briefly explained by van Regemorter (1955 p. 15), Jäckel (1975) and Gast (1983); a more detailed description is given by Greenfield and Hille (1986 pp. 34–9). The earliest example of such a 'sewn-on' slit-braid endband appears on a privately owned fourteenth-century Ethiopian codex (Petersen 1948 p. 64, fig. 37a). It has some similarity with the tying-down of the double cords in endbands on the Coptic codices PML M 586, M 590 and M 599 (see Figure 3.7[b]); however, such cords could also be the base of coloured woven endbands. This could hold for the early Ethiopian codex BL Or. 719 (written before 1434), where vestiges of coloured cord (red and green) have remained on the board edge, tied down with dark thread through one or more holes in the

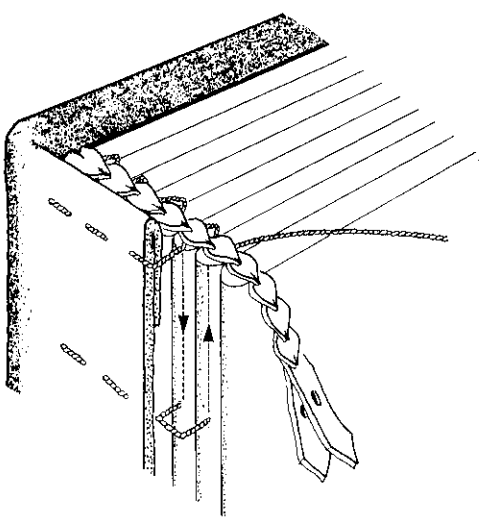

Figure 4.3 Construction of a slit-braid endband. The slit braid (see Figure 3.10) is attached to the spine edge at the head of the bookblock by stitching through the back covering, yielding two rows of running stitches.

relevant corners of the boards. Yet the binding has been restored and the main part of the endbands is lost.

4.5 FUNCTIONAL ASPECTS

The majority of Ethiopian codices are traditionally kept well protected in textile wrappers and stored in portable leather cases with straps: the *mahdar*, described in detail by d'Abbadie (1859) and van Regemorter (1962). Many codices are in good condition due to their relatively young age; they resemble a kind of archetype of the early codex and may allow for a few general evaluations of their function. One of the outstanding features is the virtually unrestricted flat opening. This is quite evident in cases where the spine is uncovered and only the sewing thread and the folds of the quires are involved in movement; but even lining the spine with leather (affixed with adhesive) does not seem to inflict restriction on the book function to any marked extent. Yet this sewing structure has two conspicuous weaknesses: first, the flat spine has an inherent tendency to become concave, with the lasting effect of bulging out of the fore-edge and hence the distortion of the codex. Secondly, the attachment of the boards by means of sewing thread is not always strong enough to withstand the mechanical strain at the joints; whereas the sewing of the quires is still intact, the thread is often broken at the board junction (Figure 4.2[b]).

NOTES

1. Between 1987 and 1995 I examined about 25 Ethiopian codices in Amsterdam UB, Leiden UB, London BL and V&A, Vienna ÖNB, Graz UB and in several private collections in Germany.
2. It is noteworthy that S. Cockerell's valuable approach to Ethiopain bindings is marred by his diagram of the sewing which correctly shows the thread movement but omits the link stitches (S. Cockerell 1977 p. 9).
3. The possibility should not be dismissed that fine strips of gut were twisted to produce a structure of a higher tensile strength. Whereas modern surgical catgut and the strings of modern musical instruments are of one solid strand, ancient Egyptians used finely twisted strips of gut of no more than 1.5 mm in diameter for making bowstrings and musical instruments (Lucas and Harris 1989 p. 29).

Chapter 5 The Islamic codex

5.1 INTRODUCTION

The Ethiopians are believed to have transmitted to the Arabs the art of binding books in codex form (Arnold and Grohmann 1929 p. 30). Southern Arabia already had contacts with neighbouring Ethiopia when Christianity temporarily established itself in that region. But a much more extensive interaction began with the Islamic conquest of the Middle East, Byzantium, Egypt and northern Africa: the codex became the basis of the Islamic book and found its way throughout an empire reaching from southern Spain to India. In the hands of the Arab craftsman the codex underwent changes: its structure was gradually simplified, but soon its embellishment even surpassed what the late Coptic binders has already brought to a very high standard. Although the fascinating decoration of Islamic bindings has always been the focus of interest, a number of important pieces of information on technical aspects were gathered in the pioneering work of Paul Adam (1904–6); Petersen (1954) evaluated the analogies of Coptic and Islamic bindings and, more recently, in an excellent overview Bosch and Petherbridge (1981) assembled the techniques and the history of Islamic bookbinding, including references to historical sources.

These sources are Arabic texts recording the very early descriptions of bookbinding techniques. The oldest is the *Book of the Staff of the Scribes and Implements of the Discerning* [. . .] *and Details of Bookbinding*, written about AD 1025 by al-Mu'izz ibn Badis, a royal patron of arts who lived near Kairouan (Tunisia). It was partly translated by Bosch (1961) and fully by Levey (1962). The manual *Art of Bookbinding and of Gilding* was completed in AD 1619 and is the work of the craftsman Abu l'Abbas Ahmad ibn Muhammad al-Sufyani. These two sources are cited extensively and interpreted by Bosch and Petherbridge (1981). Another work on the *Art of Bookbinding* by Bakr al-Ishbili, a learned bookbinder in Seville, dates from around AD 1185 to 1198; besides some biographical data, headings of chapters in Arabic (Kannun 1959–60) and a fairly detailed summary by Gacek (1990–1), the text is still awaiting its full translation. A fourth text is a didactic poem for bookbinders by ibn Abi Hamidah, *Tadbir al-safir fi sina'at al-tasfir*, composed in the fifteenth century, possibly in Damascus (Gacek 1992).

Many priceless details of, for example, tools such as the rope press and the way it was applied for cutting the edges with a knife or sword, the needles, paring knife, folders, etc., as well as materials such as papers, leathers of various tannages, leather dyes and adhesives are handed down to us by ibn Badis. The work of al-Ishbili[1] acquaints us with technical details of sewing, backing, endbanding, lining of the spine, cover attachment, covering with leather, decoration (including the use of heated tools for gilding), making clasps, pro-

tective boxes and even repairing worn bindings. Al-Ishbili distinguishes between bindings with wooden boards and fastenings of the peg and strap type and bindings with pasteboards and a pentagonal flap; he is likely to be the chief witness to the first appearance of the latter type of binding in the twelfth century, characteristic of later Islamic bookmaking.

The discussion below is based on two main sources of bindings. The first one comprises the finds in the Grand Mosque of Kairouan (Tunisia), where the remains of a library were discovered in a storeroom by Louis Poinssot in the early 1940s. Koran fragments but mostly loose covers turned out to be a treasure trove for the first attempts at reconstructing the history of Islamic binding. The whole corpus consisted of about 175 covers, dated on art historic and palaeographic grounds at between the ninth and thirteenth centuries. They are meticulously described by Marçais and Poinssot (1948) who focused on the decoration rather than on binding structures, as indeed the damaged state of the covers allowed only tentative conclusions on technical aspects.[2]

The other valuable find is that from the Great Mosque of Sanaa (Yemen), made in 1972 (Bothmer 1986; 1988 and Dreibholz 1991; 1997). During restoration work on the building a number of manuscripts (both on parchment and on paper) was found in a ceiling space. The material dates from the first five centuries of the Islamic era and comprises about 95 covers; although none of the bindings is intact, many seem to have preserved some structural integrity or parts of the sewing. The material mainly consists of Koran fragments, some of the small oblong format like those from Kairouan, others of monumental square formats of up to 500 × 500 mm. Only preliminary data on the bindings have been published so far (Dreibholz 1997).[3]

In addition to the two sources mentioned above, information on several bindings originating from Damascus (Déroche 1986) is also referred to in this chapter.

5.2 TYPOLOGY OF THE EARLY ISLAMIC CODICES

The oldest bindings from Kairouan are of a small oblong format which was gradually replaced in the eleventh century by the vertical format (Table 5.1). There is evidence that

Table 5.1 Dimensions of 173 Kairouan covers (mean value in mm) after Marçais and Poinssot (1948). The figures in brackets indicate the number of samples

Century	*Format*	*Small*	*Large*	*Total*
Ninth	oblong	112 × 172 (54)	272 × 369 (2)	56
Tenth	oblong	125 × 179 (11)	213 × 300 (9)	20
Eleventh	oblong	105 × 161 (51)	320 × 410 (1)	52
id.	vertical	164 × 124 (11)	420 × 322 (2)	13
id.	unknown			1
Twelfth/thirteenth	vertical		251 × 181	31

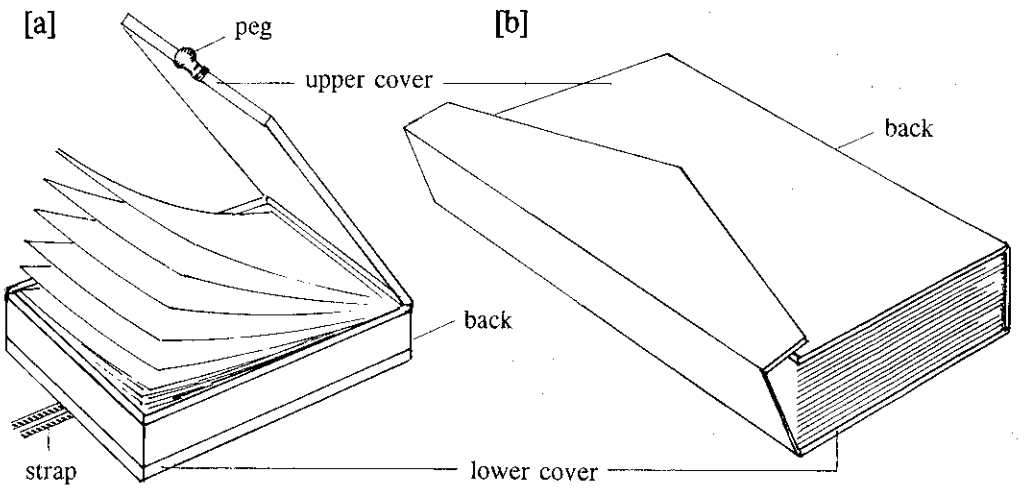

Figure 5.1 Two types of Islamic bindings: [a], box binding with wooden boards; [b], pasteboard binding with pentagonal envelope flap.

many of the oblong bindings had the shape of a box, hence called box binding (Figure 5.1[a]); the lower cover resembled the tray, while the upper cover formed the flat lid.[4] None of the Kairouan bindings has completely preserved this construction; Marçais and Poinssot's (1948 pp. 46–8, 289, fig. 1) graphical reconstruction of such a binding was based on a similar ninth-century Koran binding in Cairo which has retained the three leather walls (Arnold and Grohmann 1929 pl. 22A). Petersen (1954 figs 5, 6) reproduced this conjectural sketch of Marçais and Poinssot along with the dubious so-called reconstructed Ibscher box binding (see Chapter 3, note 10). The apparently weak argument for the genuine existence of box bindings was finally corroborated by remnants of protective walls on four small-sized oblong wooden-board bindings, probably from Damascus and dated to the ninth century (Déroche 1986), and by three instances of remnants of box bindings among the Sanaa covers, undated but closely related to the Kairouan covers (Dreibholz 1997).[5] Usually these box bindings have fastenings of the peg and strap type.

The Kairouan covers from the later period (twelfth to thirteenth centuries) have a pasteboard core; the lower cover extends over the front edge into a pentagonal envelope flap. The binding is constructed as a modern case binding, usually of vertical format and without fastenings (Figure 5.1[b]). One of the earliest examples of this type is a Koran binding from the tenth/eleventh century (Déroche 1995).

5.3 SEWING, BOARDS AND THEIR ATTACHMENT

Information on the sewing of the quires is less detailed than one would wish. The work of ibn Badis gives only a brief mention (Bosch and Petherbridge 1981 p. 47): 'Sewing

may be done by several methods: one which the artisan employs for swiftness and speed, in which the needle pierces the quire in only two places, and another done with two or three stitches. Still another type is current with the Byzantines, but I am unable to describe it.'[6] This paragraph probably refers to sewing stations and the speedy method of the basic Islamic link-stitch sewing on two sewing stations (see Figure 2.1[g]). Adam (1904–6 p. 148) was probably the first to describe and illustrate this structure on the basis of his observations of a variety of late-medieval oriental bindings. The diagram by Petersen (1954 p. 45) is based on the binding of a twelfth/thirteenth-century Koran (Baltimore WAG W 556).[7]

Only a very few of the oldest Kairouan fragments comprise quires with extant sewing. There is evidence that the sewing process started by anchoring the thread to the boards. Holes and remnants of thread along the spine edge allow conclusions about the position of the sewing stations. Most of the early covers (dating from the ninth to eleventh centuries) have wooden boards: out of 118 cases 74 were of poplar, 23 of pine and 19 of fig wood; laurel and tamarisk occurred once each. The thickness of the wooden boards ranges from 4.5 to 12 mm, with an average value of 7.3 mm for poplar and pine and 9 mm for fig wood. The illustrations of Marçais and Poinssot (1948) imply that the grain runs transverse to the spine. About half of the wooden boards have two holes for attachment of the book-block; some 33 per cent have no such holes and are assumed to have had their bookblocks attached by means of adhesive only.

The two attachment holes are located at 4 to 12 mm from the spine edge and spaced apart between 15 to 70 mm (average 33 mm), the distance between the holes being related to the height of the book. In a few cases there are loops of sewing thread around the spine edge and/or connecting threads between the two holes, lying in small grooves. Occasionally remnants of the sewing thread (often two-coloured: white and blue) can be found; most covers have not even retained parts of the quires. Only the lower cover of Kairouan no. 5 has three parchment quires still attached. The quires have four sewing holes: one at 7 mm from the top and tail edge respectively, two in the middle, 39 mm apart; pieces of sewing thread are still present (unbleached, *c.* 0.6 mm diameter, five-ply). The only other instance of extant sewing thread is a loose oblong quire (100 × 145 mm), which has a single long stitch inside the centrefold (sewing holes 30 mm apart). The illustration (Marçais and Poinssot 1948 pl. LII) features convincingly that in this case there are only two sewing stations, whereas in binding no. 5 there are possibly four.

It is unfortunate that Marçais and Poinssot (1948 fig. 3) attempted to reconstruct the sewing structure on the basis of one of the only two examples which had some sewing thread left, namely binding no. 5. The fact that their artist has represented the reconstruction of the sewing of a single-quire codex while their description (p. 72) unambiguously speaks of a multi-quire codex, has led to confusion, in the same way as Petersen (1954 pp. 42–3, figs. 1, 3) later talks of a 'codex sewn in single quire' but makes a drawing of a multi-quire sewing. While the description of the thread movement by Marçais and Poinssot (1948 p. 73) represents an unworkable structure, Petersen's proposal of a sewing on four stations and link-stitching only on two of them is feasible, but rather pointless.[8] The matter remains undecided, as it is possible that the binder considered two stations sufficient for smaller

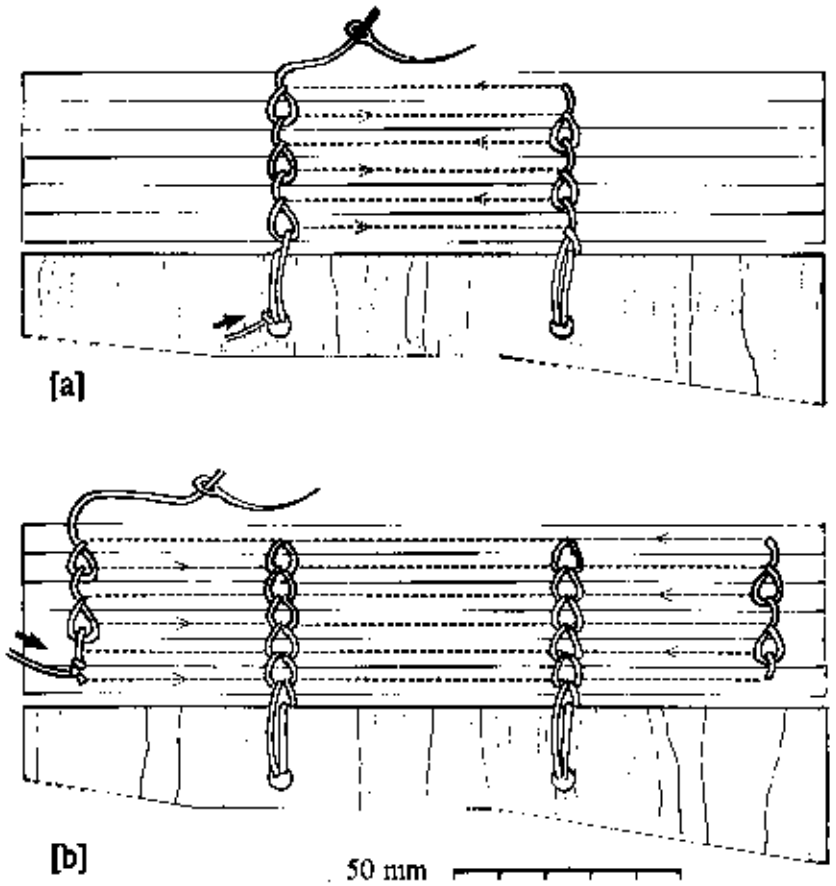

Figure 5.2 Two alternative sewing structures with two hinging loops to attach the boards. In [a], two sewing stations are used and sewing begins with anchoring the thread in the first hinging hole; [b] has four sewing stations, sewing begins at the first one and hinging loops are made while passing the second and third sewing station. The proportions are based on Kairouan cover no. 40 (Marçais and Poinsot 1948).

codices (Figure 5.2 [a]); but even if he had chosen to sew the book on four stations, the board attachment could have still been restricted to two [b].

It has been stated above that one third of the wooden boards had no traces of lacing holes, which seems to suggest that the covers were attached to the sewn bookblock by pasting down the outer leaf of the first and last quires or, alternatively, hooking a flange around the first and last quire.[9] Where the attachment is through pastedowns only, these are usually are underneath the turn-ins; this method finds further evidence in the Damascus covers (Déroche 1986).

Pasteboards appeared first on the Kairouan bindings in the tenth century, gradually becoming more frequent and (for Islamic bindings) exclusively used from the twelfth century onwards. Since they had become detached from the bookblock, most evidence of

the former attachment and all evidence of the sewing is lost. It could have been a simple link-stitch sewing (see Figure 2.1[g]) as is generally assumed for later Islamic bindings (Bosch and Petherbridge 1981 pp. 45–8), but other variants might have been used likewise. A Persian manuscript, though from 1824, evidences the use of an extended type of link-stitch sewing (Wiener 1974), see Figure 5.3.[10]

Pasteboard covers were made separately, covered and attached to the bookblock by adhesive, as in modern case binding. This is well documented in the treatise of al-Sufyani (Levey 1962 pp. 51ff.; Bosch and Petherbridge 1981 p. 57), who describes the making of pasteboard and book covers. The spine lining, made of one or two pieces of leather or cloth, protrudes from the spine by c. 30 to 60 mm on either side; the case is attached to these extensions. On a few Kairouan covers remnants of such linings and their extensions have been found: two of leather, one of parchment, four of blue cloth. The inner face of the boards is covered with doublures of leather, silk or blue cloth, pasted over the turn-ins of the covering.

The binding fragments of Kairouan and Sanaa are obviously remnants of manuscripts, which had often been repaired several times before they were finally withdrawn from use. Hence, the binding structures as they appear today may not necessarily represent their original construction. This seems to apply particularly to late Islamic codices, sewn with extremely thin thread on two sewing stations and provided with a case binding, technically inferior to its predecessor with structural board attachment and multiple sewing stations (Bosch and Petherbridge 1981 pp. 46, 56). The sacrifice of the heavier but stronger sewing thread could have been initiated by the intent to minimize swelling in order to

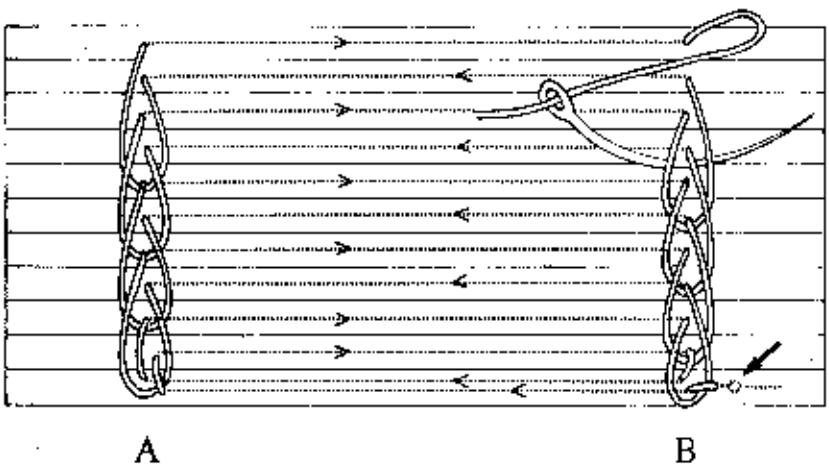

Figure 5.3 Reconstruction of the sewing of a Persian manuscript from 1824 by Wiener (1974). Sewing starts where indicated by arrow, with a knotted thread inside the fold; it exits to make a short auxiliary stitch on the back, re-enters the quire and proceeds to sewing station A. Here a span to the second quire is made; after passing the centrefold the thread exits at sewing station B and makes another span back to the first quire, which it passes a second time. Exiting at station A, a span is made to the third quire; now at sewing station B the thread makes the first link under the auxiliary stitch at the first quire. Hereafter the regular sewing begins with links dropping down three quires below the one from which the thread exits.

obtain a square bookblock with a flat spine. Obviously the problem of swelling was already at that time a matter of concern, as both ibn Badis and al-Sufyani give advice to beat down the spine with a heavy mallet (Levey 1962 pp. 42, 52; Bosch and Petherbridge 1981 pp. 47–9). Al-Ishbili further recommends the rounding of the spine to prevent the protruding of the fore-edge of bookblocks on older books (Gacek 1990–1). This is the very first indication that the tendency of the flat spine to distort had indeed been considered a problem and the rounding of the spine suggested as a preventive measure.

It is very possible that the weakness in the construction of the spine had called for the use, or even the invention, of the *rahl* (oriental book cradle), which allows the opening of the book to no more than about 100° (Jacobs and Rodgers 1990 p. 130). Nevertheless, it is likewise possible that the supporting *rahl* impeded any attempt at improving the strength of the spine mechanism. It should be mentioned at this point that the weakness of the board attachment of case bindings and the ease by which it can be severed constitutes a problem for the student of oriental bindings: the laboriously and beautifully decorated covers could easily be removed from defect manuscripts and reused on other manuscripts of a later or earlier date.

5.4 ENDBANDS

Endband remnants were found on 23 of the Kairouan covers, all of them on those with wooden boards. Their description remained rather fragmentary, since at the time the construction of oriental endbands had not been fully comprehended. The making of such end-

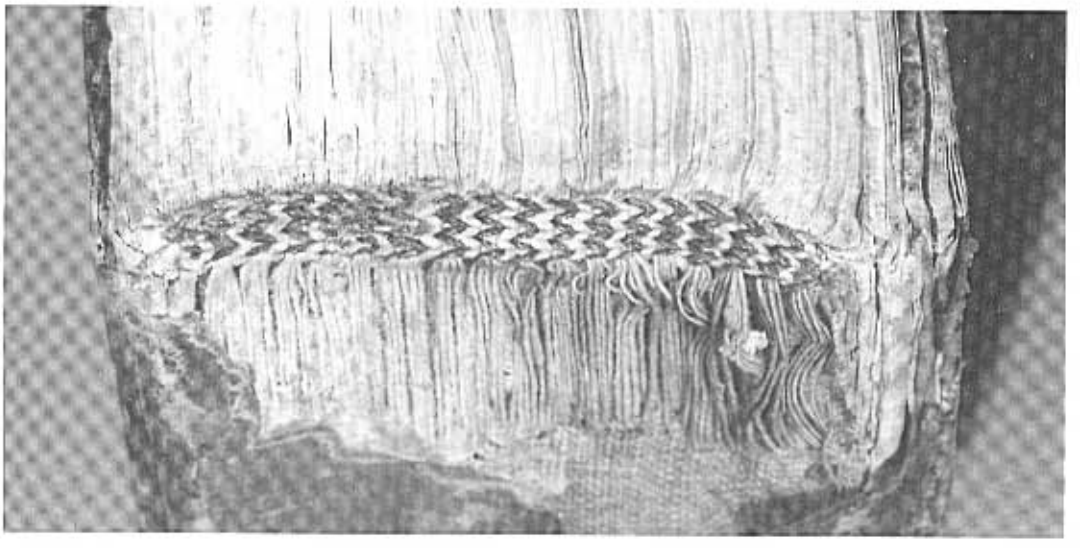

Figure 5.4 Islamic endband showing the tied-down warps (passing through the textile lining, exposed by the damaged back covering) and six wefts of two colours, viewed from the rear (BSB Cod. pers. 235, AD 1670; from Fischer 1986).

bands (Figure 5.4) was at first a puzzle to Western binders. Adam (1904–6), who restored oriental manuscripts in the 1880s and had a sound understanding of their binding structure, did not succeed in rendering the making of the endbands. Though he had realized the application of weaving, he erroneously attributed the role of the weft to the sewing thread. He offered a diagram of the principle, but did stress its conjectural character: '*ob man es wirklich so gemacht hat? Wer möchte das behaupten*' (Adam 1904–6 p. 149). Yet the idea was taken up (Adam 1911c) and elaborated upon: Jäckel (1961 p. 291) suggested that, in order to obtain the characteristic chevron pattern, threads of one or more colours were twisted first and then sewn onto the spine edge of the bookblock. This awkward procedure would result in the desired structure, but is unlikely to have been practised by the oriental binder. Today it seems to be uncontested that these endbands are worked on a strip of leather, placed on the head and tail edge closest to the spine, and tied down by a thread entering the centrefolds of each quire at some distance from the edge, thus forming the warp (Figure 5.5[a]); then two different coloured threads are interwoven, thus constituting the weft [b]. The assumption of this procedure, which was in fact described by al-Sufyani in 1619 (Levey 1962 p. 53), is supported by the fact that it is still in use today and, further, by recent studies on models by Evetts (1980–1) and Gast (1983) and particularly by Fischer (1986); descriptions are found in Greenfield and Hille (1986 pp. 65–9) and in the outstandingly illustrated *Tranchefiles* (1989 pp. 86–9).

The twelfth-century treatise by al-Ishbili seems to contain essential information on endbands. He mentions eight types of Byzantine (Greek) endbands, but describes only four of the less complicated ones, among them two chevron variants worked with two needles; he also declares that in codices with wooden boards the endbands should be laced on (Gacek 1990–1). Ibn Abi Hamidah (fifteenth century) describes how endbands are 'worked with two different colour threads and two needles; using the needles in alternation one achieves different patterns' (Gacek 1992).

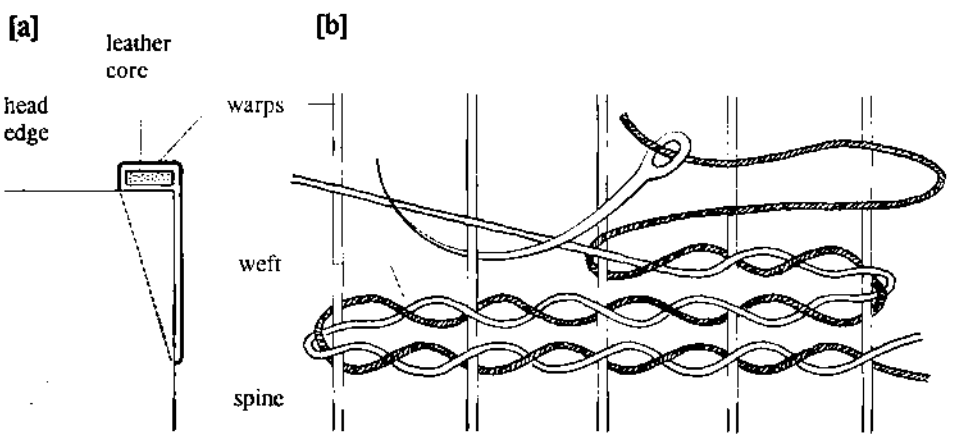

Figure 5.5 Construction of the Islamic endband: [a], the leather core tied down with thread passing through the centrefolds, constituting the warps; [b], interweaving the weft with two coloured threads.

After this excursion into the literary sources the actual Kairouan covers can be examined for evidence. On wooden covers Marçais and Poinssot (1948 pp. 19–20) noticed short grooves, that had been cut either into the top and tail of the spine edge of the boards or cut obliquely into the outer face in the corners nearest to the spine, and they referred to them as a means of anchoring the endbands to the boards. From their description of the endband remnants one can infer that leather strips had been involved ('*tranchefile en cuir*' is mentioned in connection with five codices), tied down with threads (mostly yellow: '*un cordonnet jaune*', '*soie de couleur safranée*') which passed through holes in the corners of the boards. Neither multi-coloured endbands nor the chevron pattern are mentioned. Remnants of endbands, comprising green threads anchored to the corners of the boards and vestiges of a chevron pattern in two colours, have been detected on ninth-century Damascus codices (Déroche 1986).

5.5 COVERING, DECORATION AND FASTENINGS

The leather used for covering most of the Kairouan bindings is described as red-brown sheepskin ('*basane*'). The oldest covers (dating from the ninth to eleventh centuries) were decorated with blind-tooled simple geometrical elements, illustrated in detail in numerous drawings and photographs in Marçais and Poinssot (1948); several are sketched by Petersen (1954 figs 10–17) and one is reproduced in Miner (1957 no. 37, pl. XII). Nine eleventh-century covers of black goatskin have, in addition to blind tooling, decoration of figures moulded over underlaid cords (Marçais and Poinssot nos. 118–26, figs 41–3, pl. XXV–XXVII; Petersen 1954 fig. 18; Miner 1957 no. 43, pl. XIII). Even earlier evidence of this relief technique is seen on one of the ninth-century Damascus covers (Déroche 1986). This technique is of particular interest, since one of the earliest intact Western bindings, namely the Stonyhurst Gospel (see Part II, Introduction), is decorated in the very same way.

Tooling was mostly blind; gold dots were found on three covers, one of which is dated to the ninth century (Kairouan no. 28), a strikingly early example of the application of gold. The treatise of al-Ishbili, summarizing the art of bookbinding of the second half of the twelfth century, documents the use of heated tools for blind and gold tooling (Gacek 1990-1). Heated tools and wax for their cooling is described by ibn Abi Hamidah (Gacek 1992).

Deep impressions of tools noticed in the wooden boards in areas where the covering leather had been damaged caused Marçais and Poinssot (1948) to conclude that blind tooling had been carried out with heated tools. The same assumption is made by Dreibholz (1997), who further presents new findings on tooling techniques employed on the Sanaa covers. Yet, the extant examples of oriental metal stamps, which simply comprise a shank and no handle (and therefore would have been impossible to hold when heated), as well as hammer marks on their flattened ends (see illustration in Haldane 1983 p. 19) imply that they were hammered cold into the leather. The proposition that blind tooling did not necessarily require heat is further supported by our knowledge of leather stamps or rather

blocks of incised leather that obviously had to be impressed cold (Bosch and Petherbridge 1981 pp. 68ff.). Only recently has Pankhurst (1992) witnessed and reported on the use of such leather blocks by Islamic bookbinders in Harar in eastern Ethiopia.[11]

The decoration of the leather case was probably completed before attachment, as the working of the geometrical details of astonishing complexity would have been much easier off the bookblock. The Kairouan bindings from the late period (twelfth/thirteenth century) are a prelude to those highlights of decoration featured by many late medieval and post-medieval Islamic bookbindings as described by Sarre (1923), Gratzl (1924), Arnold and Grohmann (1929), Ricard (1933), Ettinghausen (1959), Bosch, Carswell and Petherbridge (1981), Haldane (1983) and others.

The Kairouan covers with wooden boards had fastenings of the peg and strap type (see Figure 5.1[a]). The pegs were inserted and riveted in the front edge of the upper cover. Over 90 out of the 118 covers have traces of one peg only; on 10 covers traces of three pegs and on another two covers traces of four and six pegs are visible. There are 28 pegs of slightly different shapes preserved: 16 made of iron, 9 of bronze, 3 of silver (Marçais and Poinssot 1948 fig. 2). In the lower covers vestiges of leather straps, single or braided ('*bandes de cuir entrelacées*', Marçais and Poinssot 1948 p. 187), and occasionally of silk cords or bands are perceptible. Whether metal rings had been involved in the fastening or not is a matter for speculation. The straps were attached through sets of holes in the lower cover, with the slips pasted down on the inner face; in half of the cases there is evidence of sets of three holes, a few having sets of two and one of only one hole. Remnants of the same types of fastening are found on covers of the Damascus codices (Déroche 1986); one of the Sanaa wooden covers retained its metal peg, but only vestiges of the strap (Dreibholz 1997).

NOTES

1. The language barrier prevents me from evaluating the details of this important Arabic text, published by the 'Instituto de Estudios Islámicos en Madrid' (Kannun 1959–60), so I that I have to rely on the summary provided by Gacek (1990–1). Translation into a Western language is a desideratum.
2. The description lists 156 bindings; however, in many cases several covers or fragments have been entered under the same number. My interpretation of Marçais and Poinssot's data yields remnants of 173 bindings, disregarding six fragments which are too incomplete to provide any useful information on stuctural aspects.
3. I owe thanks to Ursula Dreibholz for unpublished records on the Sanaa bindings.
4. For books in languages written from right to left and back to front, like Arabic and Hebrew, the term upper cover describes the cover at the beginning of the text.
5. On the Iberian peninsula, the box binding seems to have survived notably on Hebrew texts. Examples are a Pentateuch printed in 1491 in Lisbon (illustrated in Miner 1957 pl. XXXIV and described in detail by Avrin 1989), three Hebrew manuscripts from Spain and Portugal (Avrin 1989) and a Hebrew bible (Brussels BR MS 19.117, s. xiii/xv). Two fourteenth-century box bindings, again on Hebrew texts and decorated with cuir-ciselé, are described and illustrated in Schmidt-Künsemüller (1980 nos. 70, 320). A considerable number of Western cuir-ciselé bindings has been attributed to Jewish bookbinders.
6. The translation of the same passage by Levey (1962 p. 42) differs somewhat: 'There are ways of bundling (gathering in sewing). Some are used by craftsmen for ease and quickness. It is that the needle penetrates two places. Others work with two needles or three. I saw the Greeks do it but I cannot approve of it. I cannot describe it.' There is an obvious ambiguity in the very different meaning of 'two or three needles' and 'two or

three stitches'. This example illustrates the formidable problem of accurately translating an ancient technical text without insight into the craft. Gacek (1990 1) alludes to this difficulty and provides a list of terms used in the text of al-Ishbili but not given in any standard dictionary.

7. Note that the captions of figures 2 and 3 in Petersen (1954) have been erroneously confused.
8. This sewing is a variant of the archival sewing used in simple European limp bindings from the fifteenth century onwards (see Figure 10.15).
9. The term 'flange' is being used for a strip of material, wider than a guard, usually of parchment or paper, which is hooked around the outer quires and forms part of the sewn bookblock; it is affixed with adhesive to the inner face of the boards, thus providing a connection between bookblock and cover. The term is equivalent to the German '*Ansetzfalz*' or '*Ansetzflügel*'.
10. During the restoration of the manuscript Wiener (1974) exemplarily demonstrated a most sensible method for identifying a sewing structure; before pulling the quires, the short ends of the thread are stained in order to facilitate close observation of original thread movement on unravelling the sewing.
11. In order to test the effect of temperature in blind tooling, I carried out simple experiments with a modern brass dye heated to 20, 40, 60 and 80°C respectively and pressed for 10 minutes on samples of various leathers. Whittawed pigskin showed hardly any differences and brown calf only slight differences, while natural calf displayed noticeably darker impressions with increasing temperature. To interpret these observations one must consider that two main factors are involved: local pressure on dampened leather (which had been saturated with paste in the covering operation) compresses the dermal fibre meshwork and exudes liquid; on drying (*c.* 10–15 min.) the adhesive will set and ultimately maintain the impression. This effect applies to low temperatures of about 20 to 60°C. For higher temperatures a further effect comes in, namely the shrinkage temperature of the collagen protein at about 70°C for native skin, as a rule increased after tanning (Reed 1972 pp. 314 ff.). On the application of heat the dermal fibre mesh contracts instantaneously and irreversibly. It is interesting to note that chromium tannage, which raises the shrinkage temperature of collagen to above 100°C, renders the leather unfit for blind tooling: it will be scorched before a lasting impression has been achieved.

Chapter 6 Byzantine codices

6.1 INTRODUCTION

The ambiguity of the term 'byzantine binding' makes it necessary to clarify how it shall be applied in what follows. The vagueness of the term has its roots in the historically unsettled question of the beginning and ending of the Byzantine Empire as well as its frequently changing boundaries. In terms of geography, the bookmaking tradition of the Byzantine realm was not restricted to the mainland with Constantinople as its political and cultural centre, but had close ties with many adjacent regions like Armenia, Georgia, Syria, islands of the eastern Mediterranean such as Cyprus or Crete, Greece with the Athos monasteries, and the Slavic nations of the Balkans. Vast distant regions like Russia were also part of the same book culture, and so was St Catherine's monastery on Mount Sinai and even parts of Egypt; the closely related late Coptic codices (see Chapter 3) remind us that Alexandria was one of the early patriarchates of the Byzantine Church.[1]

Geographical borders thus seem not to be suitable grounds for defining the term, yet the same holds for chronology: the culture of Byzantium did not suffer an immediate collapse by the Fall of Constantinople in 1453, and its binding tradition continued in some regions even for centuries to come. Hence, it is proposed to consider 'byzantine bindings' as a typological entity and characterize them on the basis of their main structural features: link-stitch sewing on more than two sewing stations, spine lining of cloth extending to the outer face of the boards, smooth back, wooden boards usually with grooved edges and attached to the bookblock by means of the sewing thread, no squares, endbands extending onto the board edges, and fastenings of the peg and strap type. Obviously, these features can vary with the date and place of origin of the bindings and not all traits are necessarily always present.

Two types of bindings, although clearly belonging to the same family, have such distinct features that they require separate discussion. Although there are bindings produced in the Western world far beyond 1453 which have fully retained their byzantine traits, many more have been significantly modified by Western structural or decorative elements; the latter have been designated 'alla greca' bindings and are treated in section 6.11.[2] Secondly, there are the Armenian bindings, which fulfil virtually all the above criteria but employ Western sewing supports; they take a special position within the category of byzantine bindings and are therefore discussed separately in section 6.12.

Hardly any original binding from the first half of the Byzantine millennium has managed to survive, mainly due to three reasons: first, the extensive destruction of religious literature on the fall of the Byzantine Empire, second, the shameless neglect and ignorance

of custodians, who had no inhibitions about using leaves of ancient manuscripts to cover jam-jars or light the kitchen stove.[3] The third – and possibly saddest – factor was the later private and institutional owners, who had the supposedly unsightly bindings, damaged or undamaged, rebound to fit the taste of the period. Thousands of byzantine works in large collections in the Western world were stripped from their original covers; this is clearly reflected in a recent survey of the collection of byzantine bindings in the Vatican Library by Federici and Houlis (1988), which brought to light that out of 4700 Greek manuscripts only 94, in other words not more than 2 per cent, have retained their original bindings, dating no earlier than from between the eleventh and seventeenth centuries. A sad consequence of the lack of extant bindings from the first half of the Byzantine millennium is that it has become virtually impossible for us to assess the extent of the influence of this bookbinding tradition on the evolution of the binding structures of the Western world.

Although this insignificant figure of only 2 per cent demonstrates that our knowledge of byzantine bindings is truly built on sand, a relatively large amount has been written about them. Adam (1914; 1923–4) wrote down his valuable observations on Greek bindings, but mostly without providing his sources.[4] Van Regemorter published two studies (1954; 1967) on byzantine bindings and two articles on Armenian (1953) and Southern Slavic (1959) variants.[5] Klepikov (1961) has presented some details on Russian bindings; a brief outline of byzantine binding structures was given by Irigoin (1981). Byzantine bindings from the Peloponnese were the subject of a study by Grosdidier de Matons (1991). The first systematic attempt at investigating byzantine bindings was made by Petherbridge (1991) who laid out important basic guidelines for their study. An extensive work is the investigation of 94 byzantine bindings and a further 18 detached byzantine covers in the Vatican Library by Federici and Houlis (1988), mentioned above. Their study holds such a wealth of numerical data that their own statistics can hardly do justice to it. Nevertheless, it is an admirable and exemplary attempt at scrutinizing the complexities of binding structures; its significance is limited by the too small number of still intact bindings and their many different and often uncertain provenances, which in fact are only established for 48 out of 112 bindings and covers (25 are from Constantinople, 7 from Cyprus, 5 each from Crete and Italy, 4 from Greece, 1 each from Thrace and the Near East). Sixty bindings are dated to the fifteenth century or later; of the 50 earlier bindings (mostly from the fourteenth century, only one from the tenth century) 24 are probably not in their original binding. Further details of the sewing structures in this material have been published by Houlis (1993). Additional details are given by Mokretsova (1994).

An investigation into *c.* 160 codices in the Patmos Monastery of St John the Theologian was initiated in the 1980s by Guy Petherbridge and John L. Sharpe III, but so far only a few details have been made available (Petherbridge 1991). Such studies on bindings from a given monastic library hold indeed promising results, since the material is likely to be far more homogeneous than what has landed by chance in collections of our large libraries. It is regrettable that manuscript surveys like those of the 1950 Sinai and Jerusalem Expedition (Clark 1953) and the 1960 Mount Sinai Expedition (Forsyth 1964; Weitzmann 1964) failed to pay attention to binding structures. Still, at least some information on bindings in St Catherine's monastery on Mount Sinai is provided by Harlfinger et al. (1983)

and Sonderkamp (1991). Geographical differences in technical details have been studied by Canart, Grosdidier de Matons and Hoffmann (1991). The above studies as well as a few others concerning details to be mentioned in due course are the basis of the following account; references to my own observations are given where appropriate.[6]

6.2 BOOKBLOCK, ENDLEAVES AND SEWING STATIONS

The quires of byzantine manuscripts consist of parchment and later of paper, of both western (often Italian) and oriental origin. There is ample evidence of quire tacketing used to join the leaves of individual quires, as tackets were frequently left in place on sewing the bookblock; often vestiges of such tackets or redundant holes indicate previous tacketing. Tackets of parchment, usually twisted, or short pieces of thread were employed between two closely spaced holes in the centrefold or taken over its edges; sometimes pamphlet sewing was used (Petherbridge 1991 pp. 376–9, figs 1–4).

The scribe often left the first leaf and one or more of the last leaves of the textblock blank so that they could serve as protective endleaves; if not, the binder would provide endleaves, such as a single leaf hooked around the first and last quire or a bifolium as a separate endleaf quire. Original endleaves have sewing holes in register and prepared in the same way as the main sewing stations. These types of endleaves are in fact mentioned by Federici and Houlis (1988 p. 22, fig. 11) but their relative frequency is not given; other authors have failed to give details of the endleaf structure. According to my own observations, mainly of Serbian fifteenth- and sixteenth-century bindings, endleaves are often absent altogether, even when the text begins on the first page; of those bindings with endleaves, they are seldom pasted down, leaving the inner face of the wooden boards exposed.

The sewing stations on the 94 byzantine codices were thoroughly studied by Federici and Houlis (1988). They found their number to vary from three to seven, with four being the most frequent, followed by five and three. Their measurements of the disposition of the sewing stations have been rendered on Cartesian coordinates, which allowed them to establish four characteristic groups (pp. 109–13). Yet this distinction does not seem to yield any plausible explanation for the observed differences, nor does it disclose any relation to the marked variations in the dimension of the volumes (spine height ranging from 107 to 420 mm, with an average of 234 mm); calculation of the correlation between the number of sewing stations and the height of the bookblock from the data of Federici and Houlis (1988) resulted in an insignificant coefficient ($r = 0.56$).

Through replotting the data of Federici and Houlis I have arrived at a graphic representation which reveals two basic patterns of disposition, independent of the numbers of the main sewing stations (Figure 6.1). Pattern A, found with three, four and five sewing stations, maintains characteristically an even spacing of the stations; the distance between the outermost stations and the head and tail of the bookblock, that is, the outer spine segments, equals about half the distance between the intermediate stations. Pattern B shows the same even spacing of the intermediate stations, but the outer spine segment is divided by an addi-

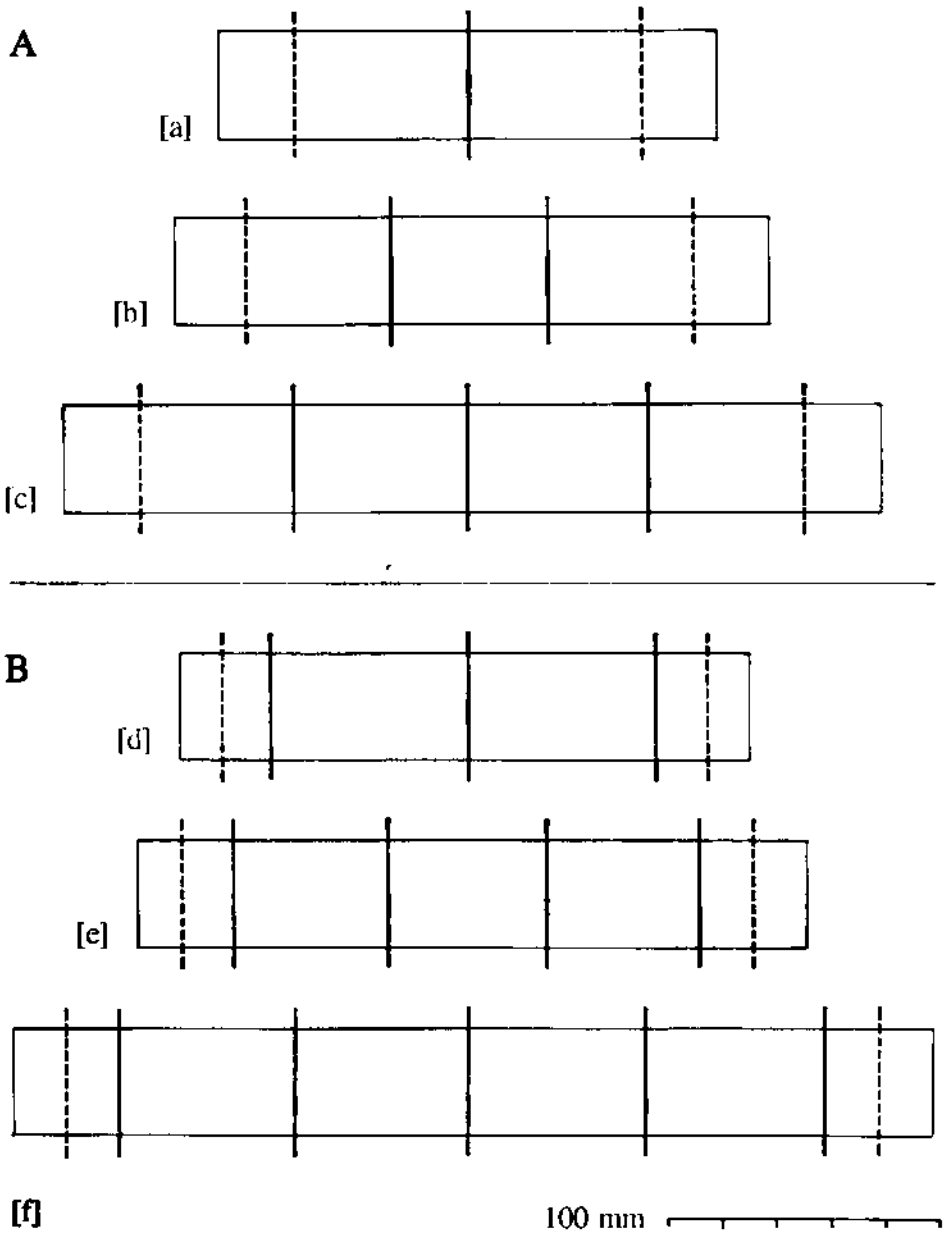

Figure 6.1 Two patterns of disposition (A and B) of the sewing stations of 94 byzantine bindings in the Vatican Library, as derived from the data of Federici and Houlis (1988). Broken lines indicate change-over stations. The distances are mean values based on the following numbers: [a] 25, [b] 28, [c] 13, [d] 10, [e] 13, [f] 5.

tional station (shown as a broken line in Figure 6.1) which takes over the change-over function. About two thirds of the 94 Vatican codices display pattern A and one third pattern B. In the later and more detailed examination of 22 of those 94 byzantine codices, Houlis (1993) indeed recognized these two patterns; he observed that pattern B can have change-over stations either with pierced holes or with nicks. Applying the chi-square test to the data of Federici and Houlis (1988) and Houlis (1993) I found that pattern A occurs significantly more often in the older material (dating from the fourteenth century and earlier); pattern B seems to be a later (fifteenth century and later) development (chi-square test $\chi = 6.2$). Pattern B was also recorded on the material from Patmos (Petherbridge 1991 pp. 401–43).

With these two basic patterns of A and B the variations in the disposition of the sewing stations on byzantine bindings are by no means exhausted. For example, there are instances where the central intermediate station is omitted (Figure 6.2[a]); other variants exhibit an increase in the outer segments ([b] and [c]). It is too early to tell whether the disposition of the sewing stations was characteristic for a certain workshop or a given geographical area or a certain time or period; also, new dispositions may have been introduced when rebinding. For example, on Cambridge UL Add. 3574 the original pattern A (see Figure

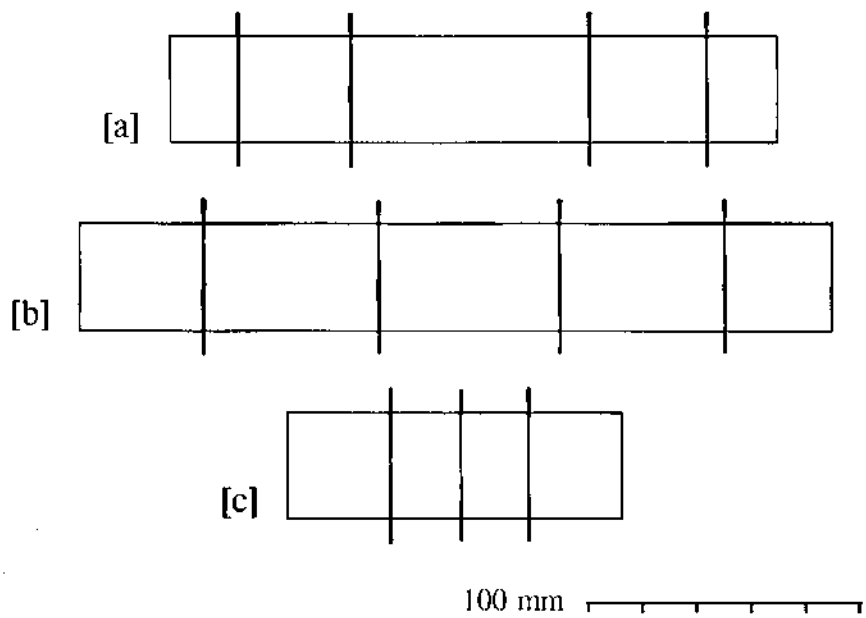

Figure 6.2 Three less frequent dispositions of sewing stations on byzantine bindings. Pattern [a] is based on two bindings (Vat. Barb. gr. 85 and Leg. Vat. gr. 1450) with the central sewing station omitted; pattern [b] shows the mean values of three Vatican codices (Vat. gr. 127, 2564 and Leg. Vat. gr. 1298) where the outer spine segment is *c.* 60 per cent of the intermediate spacing (data from Federici and Houlis 1988); in two small Georgian codices (Graz UB MS 2058–2 and MS 2058–3) the outer segments exceed the intermediate spacing by *c.* 140 per cent [c].

6.1) was replaced later by pattern B; on rebinding the fourteenth-century South Slavic manuscript ÖNB Cod. slav. 12, the spacing was changed from pattern B to pattern A.

The final step in preparing the bookblock for sewing was to provide the sewing stations with suitable holes. Usually V-shaped grooves (*c.* 45° opening) were cut through the spinefolds by means of a knife or chisel, evidently to accommodate the bulk of the chains (Federici and Houlis 1988 p. 23, figs 12, 13). However, on several of the Mount Sinai manuscripts only single perpendicular cuts were observed (Harlfinger et al. 1983 pl. 6, 54). Pierced sewing holes at the change-over stations were noticed by Petherbridge (1991 p. 385) and Houlis (1993).

6.3 SEWING

Three main features are characteristic of the sewing of byzantine codices: (a) link-stitch sewing on more than two sewing stations, (b) an extended type of link stitch resulting in comparatively bulky chains and (c) the technique of sewing two halves of the bookblock separately and joining them afterwards. It seems remarkable that these aspects have only very recently become clearly established, mainly thanks to Petherbridge's study of the Patmos material, where the use of extended link stitch and the sewing of two halves was recognized (Petherbridge 1991). Although the use of unsupported link-stitch sewing of oriental (and 'Greek') bindings was already observed by Adam in 1923–4, many details had remained unclear; the same applies to the extensive studies by van Regemorter (1954; 1967), who misinterpreted some of her, indeed partly correct, observations.

It was probably due to van Regemorter's widely accepted authority that her confusing descriptions of three different sewing methods were not questioned earlier and thus in fact they hindered correct insight any sooner. Her descriptions (1954 p. 6; 1967 pp. 117–18) of what she calls methods 1 and 3 are rather brief and vague, but they probably refer to link-stitch configurations α and β as described in section 2.2 (see Figure 2.1).[7] Van Regemorter's method 2 describes the thread movement that the Western binder calls 'two-on' sewing (see section 9.4) which seems to be unsuited for link-stitch sewing structures; it has not yet been reported on byzantine bindings.[8]

Van Regemorter was apparently not aware of the occurrence of the extended types of link stitch (see Figure 2.1[c] and [d]), which tend to produce rather bulky chains (Figure 6.3). Instead, she assumed that the chains were reinforced with another thread. This thread would start with hinging loops to attach the boards to the already sewn bookblock and then continue by passing through the chains halfway across the spine, where it would meet the thread coming from the other board and the two would then be knotted. Van Regemorter (1967 p. 118) claimed to have observed the thread running in the opposite direction ('*châinettes de renforcement qui changeaient de sens au milieu du dos*'), felt the knots under the covering of the back and occasionally saw loose threads running between the knots. Just as she was about to solve the problem she failed to recognize that what she had regarded as reinforcing threads were in fact two chains of the sewing itself meeting halfway across the spine.

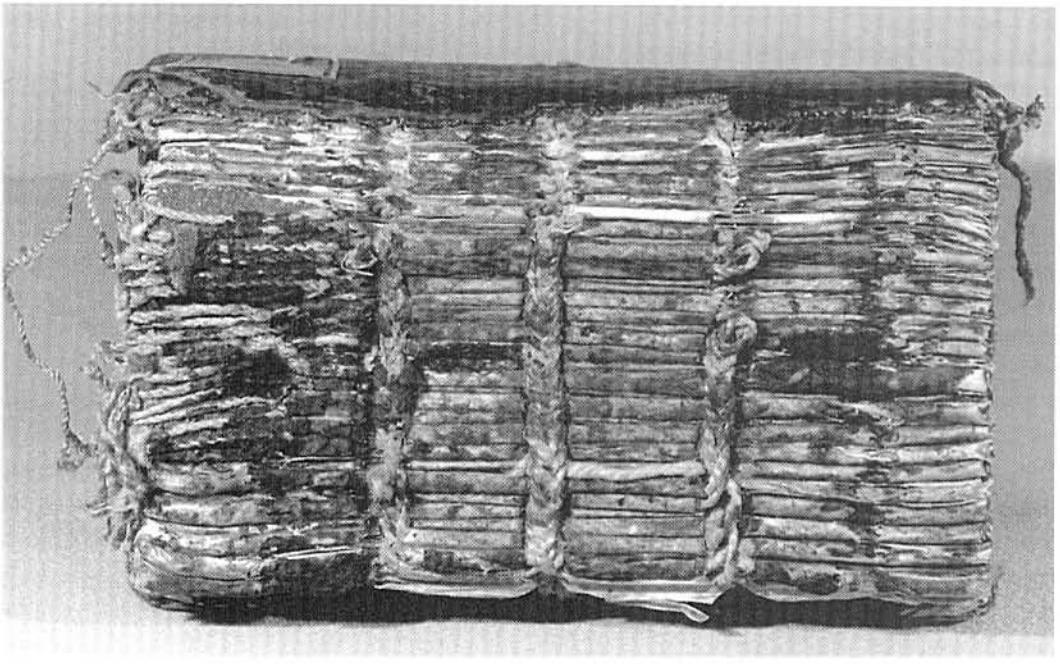

Figure 6.3 Bulky chains of the extended link-stitch sewing on the spine of a tenth-century Georgian Psalter (Graz UB MS 2058–2, 140 × 112 × 90 mm).

Sewing the bookblock in two halves and joining the two in a separate operation (Figure 6.4) was observed by Petherbridge (1991 p. 398, figs 11, 12) in several codices and designated as 'biaxial stitch disposition'. It was often found in bindings from Constantinople and Crete and occasionally in bindings from Cyprus and Greece (Canart et al. 1991). It was not noticed by Federici and Houlis (1988) in the Vatican material, but was later observed by Houlis (1993), who also mentions it in another 14 bindings of Greek origin. For Russian bindings it is well documented by Mokretsova (1994; 1995). My own findings concern three Greek manuscripts (PML M 748, s. xi, Anatolia [?]; Cambridge UL Add. 3048, s. xv, and Add. 3574, s. xi^{in}) where, due to their uncovered spines, I could determine the link-stitch direction and observe loose ends of thread on the spine and the distinct joining figure-of-eight hitches. The reason for sewing a bookblock in two halves is not quite apparent, but it is possible that the binder wanted to have an identical and equally sound mode of hinging at either board. An excellent overview of these and many other aspects of the sewing of byzantine bindings is provided by Grosdidier de Matons and Hoffmann (1998).

The sewing thread of byzantine bindings has not received much attention, beside Petherbridge's valuable guidelines on how and why sewing threads should be analysed (1991 pp. 386–91). Federici and Houlis (1988) assumed that linen or hemp were the most likely materials, but give neither analytical data nor structural details of the thread. My own

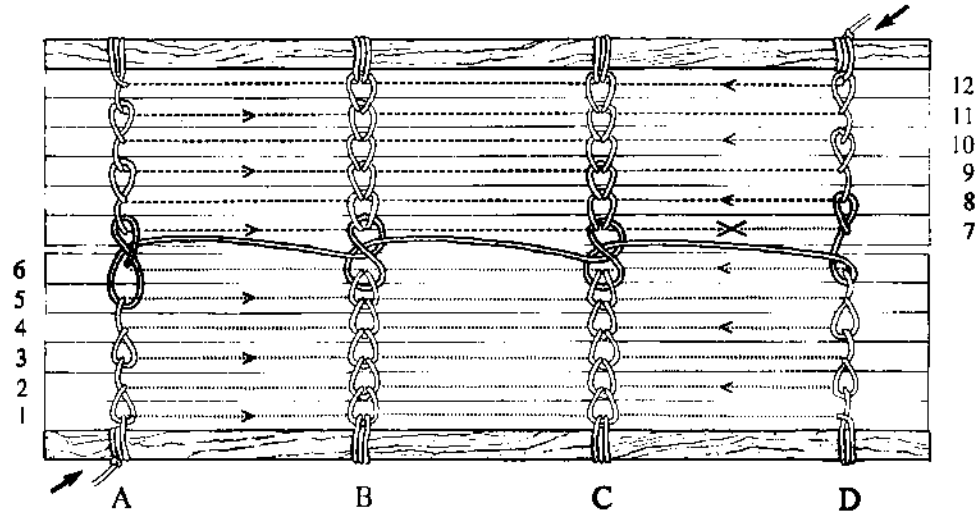

Figure 6.4 Sewing two halves of a bookblock. Sewing begins at the arrows with anchoring the boards: the first quire (1) to the upper board, the last quire (12) to the lower board. The two identically sewn halves are joined through figure-of-eight hitches which are made here with the thread of the lower half; the final knotting of the two threads may be in the centrefold of quire 7 (X), or on the spine.

observations of about 20 byzantine bindings do not allow for any definite conclusion but may still serve as examples. The oldest bindings, namely those of the Georgian manuscripts from the ninth/tenth century (Graz UB MS 2058–1 to 2058–4; see Imnaischwili 1977) are sewn with threads of a diameter of 1.3 to 1.8 mm; one (MS 2058–2; see Figure 6.3) has a single-ply thread (2z–S), the three others have re-plied threads with a final Z-twist, two of them with the structure 2z-2s-Z, no. 1 has a twice re-plied thread (2s-2z-2s-Z). Late medieval sewing threads seem to be of smaller diameter: the threads of 10 Southern Slavic and Greek codices (ÖNB Cod. slav. 2, 12, 16, 28, 34, 42, 57; Cod. Suppl. gr. 1, 33; Cod. Theol. gr. 223) range from 0.6 to 1.1 mm; four are re-plied with Z-twist (2s-2s-Z) and six are single-plied with S-twist (2z-S).

6.4 METHODS OF BOARD ATTACHMENT

Three different methods for the attachment of the bookblock to the boards have been postulated for byzantine bindings (Federici and Houlis 1988 pp. 24–6, figs 15–17): (a) the binder begins with making the hinging loops on the board at the first station, enters the first quire, exits at the second station where hinging is carried out, and proceeds in the same sequence, thus carrying out board attachment concomitantly with the sewing and using the same piece of thread; (b) both boards first receive a complete set of hinging loops made from sewing thread, then another needle is threaded and the sewing starts, linking the first quire to the prepared hinging loops; and (c) the sewing of the bookblock

and the making of the hinging loops on the boards are carried out independently and, in a final step of the operation, boards and bookblock are joined together with two separate lengths of thread. Method (a) seems to be the most efficient and is employed on sewing bookblocks in two halves (see section 6.3); methods (b) and (c) seem less advantageous but may have proved useful for repairs. In order to distinguish between these three methods the hinging must be exposed and the beginning of the thread movement, as well as differences in the thread structure, must be detectable, as pointed out by Houlis (1993).

The anchoring of the hinging loops shows a large number of different configurations. True comprehension and reconstruction of the lacing path would ideally require free access both to the inner and to the outer face of the board along the spine edge. This prerequisite can seldom be fulfilled, notably because of the heavy cloth lining, extended to the outer face of the board, and the leather covering; fortunately, the inner face is often accessible. This is evident in the study of Federici and Houlis (1988), who could scrutinize the inner faces of boards of 98 out of 112 bindings, but the outer face of only 11 bindings.

Federici and Houlis (1988) report 14 cases where the inner face of the boards is smooth and devoid of any trace of a hinging system, but where threads enter the spine edge of the boards. This observation could concur with an earlier finding of the attachment system on a binding from Mount Athos Vatopidou monastery (Adam 1912a p. 154): the board has on its outer face a groove running at a certain distance – parallel with the spine edge; corresponding to the position of the sewing stations of the bookblock holes are drilled obliquely from the groove towards the spine edge (Figure 6.5). It should be mentioned that similar grooves and holes were found on a pair of wooden boards from Egypt (Dublin, Chester Beatty Library Inv. nos. 3–3a), which could represent the same type of attachment (van Regemorter 1958b; Powell 1963). Nine out of 14 bindings in the Vatican collection with possibly this kind of board attachment are dated to the ninth to the fourteenth centuries, five of these originate from Constantinople. Further examples of bindings from Constantinople and also Crete are provided by Canart et al. (1991). I may add another four

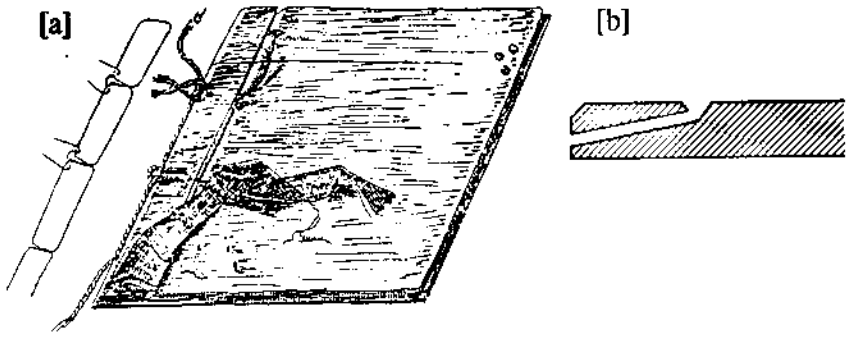

Figure 6.5 [a], drawing by Paul Adam (1912a) of a detached cover originating from the Vatopidou Monastery, Mt Athos, with remnants of the hinging loops; diagram [b] shows in cross-section the path of the hinging loop through the spine edge of the board.

bindings to the list: a Greek Menologeon (Amsterdam UB I D 75, s. xii/xiii) and three Southern Slavic codices (ÖNB Cod. slav. 2, 12 and 28, s. xiv–xvi).

A much larger group of byzantine codices shows the most frequently employed zigzag hinging system, already encountered in late Coptic codices (see section 3.3, Figure 3.4[c]). This type of attachment offers a seemingly endless variety, thwarting any simple classification. It is based on making a series of hinging loops through sets of holes along the spine edge of the board and carrying the thread obliquely from one loop to the next. Three basic variants are shown in Figure 6.6: in [a] the sets of two holes are drilled perpendicularly to the board surface, hence the length of the loops is identical on either face of the board; in [b] at least one of the two holes is drilled obliquely, resulting in shorter loops on the inner and longer loops on the outer face of the board; in [c] the two holes are drilled obliquely to merge in a joint hole on the inner face, with a free exit in the spine edge of the board. Shallow channels may be cut into the surface of either side of the board and notches cut in its spine edge to accommodate the thread; the loops may be made solely between the two holes or taken around the board edge. The zigzagged thread is usually taken across the outer face, but may run on the inner face of the board; among the 112 Vatican bindings (Federici and Houlis 1988) the distribution of these two modes was 71 and 14 per cent respectively. According to Houlis (1993), a zigzag on the inner face is often found on less carefully executed bindings from Cyprus. Illustrations of zigzag hinging are given by van Regemorter (1967 pl. I), Federici and Houlis (1988 pl. XXV–XXVII, XXIX–XXXVI), Harlfinger et al. (1983), Sonderkamp (1991), and Petherbridge (1991); some Russian variants are provided by Mokretsova (1994).

Another type of hinging consists of a series of loops perpendicular to the spine edge but interconnected with the thread running in straight lines. The thread connecting the loops runs either along the spine edge or at some distance from the edge, either on the inner or outer face of the board. This 'straight-line attachment' has also been observed on late Coptic codices (see section 3.3, Figure 3.4[a] and [b]). Although van Regemorter (1954 p. 8; 1967 pp. 121–3, figs 8 and 9) mentions this attachment only for a few bindings (Istanbul Topkapi gr. 85; Mount Sinai gr. 465; Venice Biblioteca Marciana App. gr. VI 10), she suggests its frequent use in Georgian codices. The Georgian codices Graz UB MS 2058–2 (Figure 6.7) and Graz UB MS 2058–3, and Mount Sinai gr. 754 (Harlfinger et al. 1983 pl. 142) indeed show this type of board attachment.

Yet another type of attachment was first described by van Regemorter (1959) on Southern Slavic bindings: they have a V-shaped channel on the inner face of the board to accommodate the hinging thread (Figure 6.8). This triangular arrangement is to a certain extent similar to the carolingian board attachment using cords as sewing supports, but different inasmuch as in the carolingian boards the V-shaped channels are always on the outer face. This attachment was also noted by Goff (1975) on bindings from the Serbian Monastery of Chilandariou on Mount Athos, by Federici and Houlis (1988) on four bindings of the Vatican material (only one of known origin from Greece), and by Canart et al. (1991) on several bindings from Mount Athos and also on later 'alla greca' bindings. My own observations refer to the already mentioned Cambridge UL Add. 3048 and PML M 748, both sewn in two halves, ÖNB Cod. slav. 42 (s. xiv, Mt Athos, Bulgarian Zographou

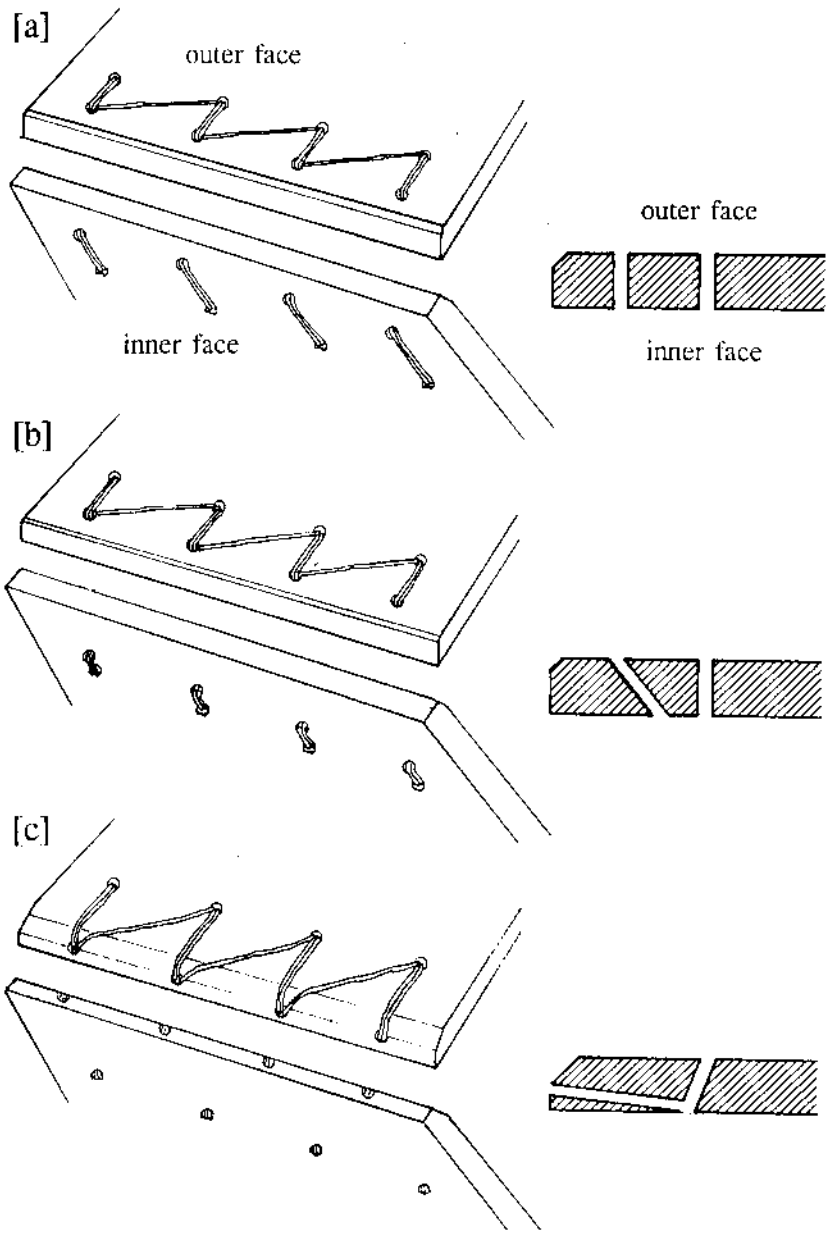

Figure 6.6 Variants of the zigzag hinging system, showing the oblique threads on the outer face of the boards; the corresponding cross-section of the spine edge of the board is shown at the right. Note that in [c] virtually no thread is visible on the inner face.

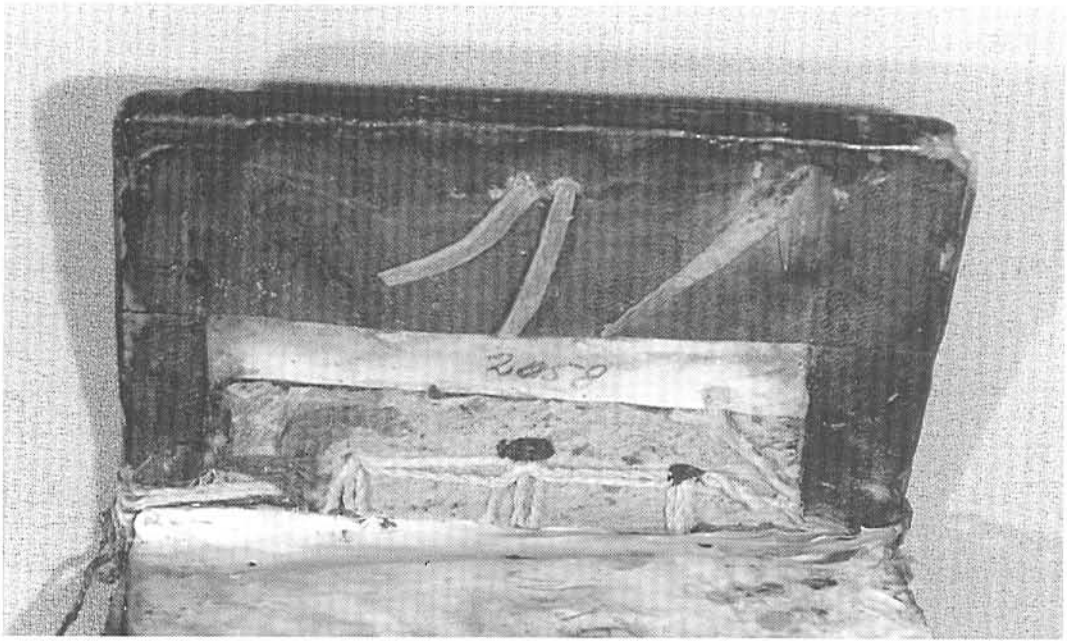

Figure 6.7 Board attachment of the 'straight-line type', as seen on the inner face of the upper cover of a Georgian Psalter (Graz UB MS 2058–2, s. x). Note the vestiges of the fastening strap (in the middle) and of a bookmarker (at the right).

monastery) and ÖNB Cod. slav. 57 (s. xvi, Serbian, Dečani monastery). In some cases the V-shaped channels seem to lay on the outer face with a single connecting thread on the inner face of the board; occasionally the latter is markedly slanted (ÖNB Cod. slav. 14 and 34).

Finally, it should be mentioned that two bindings in the Vatican survey of Federici and Houlis (1988 p. 31, fig. 21) have separate straight attachment loops at each station; Merian (1993 p. 99) proved one of them (Vat. Barb. gr. 85) to be the attachment of double cord sewing supports, characteristic of Armenian bindings (see section 6.12).

6.5 BOARDS

Virtually all byzantine bindings have wooden boards. In 73 cases, Federici and Houlis (1988 pp. 79–81) were able to identify the kind of wood: the most frequent was poplar (34), followed by conifer (20), oak (7), beech (5), walnut (4), fruitwoods (2) and olive (1). On Russian bindings Mokretsova (1994) recorded conifer, oak and limewood. In the Vatican material the grain direction of the wood was predominantly vertical (89 per cent); in my own sample of about 20 bindings the distribution between vertical and horizontal

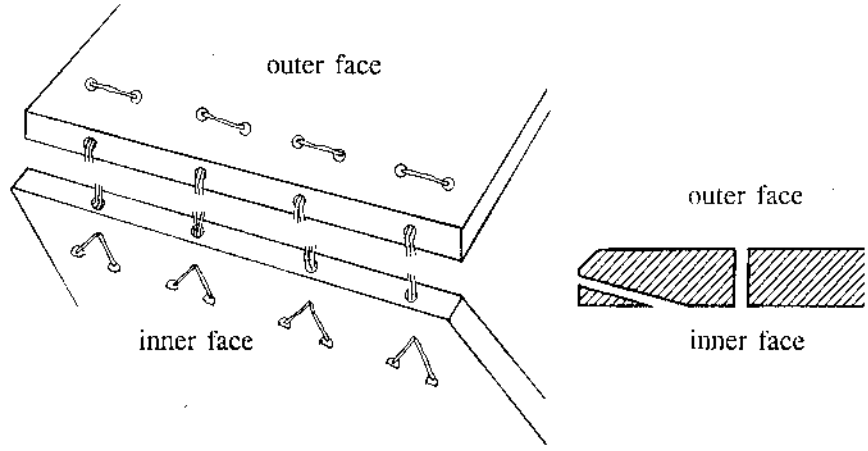

Figure 6.8 V-shaped board attachment as often encountered on Southern Slavic byzantine bindings. The bifurcation is usually on the inner face of the board.

grain direction was about even. The thickness of the boards of the Vatican material has a mean value of 11.7 mm (ranging from 5.5 to 22.5 mm).

The boards are flush with the bookblock and often have grooves in the edges. Adam (1923–4 p. 32) was the first to suggest that this was adopted from Coptic bindings with double boards, where the grooves were the result of covering the two boards separately (see section 3.3, Figure 3.5[b]). Van Regemorter (1954 pp. 4–5; 1967 pp. 118–19) reports on various Greek codices which clearly have double boards (Athens BN MS 629, MS 2511; Milan BA MS L. 107 sup.; Rome, Biblioteca Vallicelliana MS F. 59) and others which have single boards with grooves cut all around the edges (Milan BA MS M. 24 sup.) or stopping short before the corners (Athens BN MS 232 and MS 2363; Brussels BR MS II 2405; Milan BA A. 78 sup.). At times, seemingly characteristic of Southern Slavic codices (van Regemorter 1959 p. 36), these grooves have bifurcated ends. I can indeed support van Regemorter's findings with several Southern Slavic bindings I studied, but also query them with the Syriac Tetraevangeleon (PML M 748; s. xi) and the fifteenth-century codex from Constantinople (ÖNB Cod. Theol. gr. 223). Grooves are well documented in the Vatican holdings: one third is devoid of grooves, the remainder provided with one of several variants (Figure 6.9[a] to [f]). Canart et al. (1991) note that grooved edges occur less frequently on bindings from Cyprus.

Van Regemorter (1954 p. 5) noticed that the spine edge of the boards is often rounded on the outer face and only occasionally on the inner face; she explains the rounding of the inner spine edge as a means to compensate for any swelling of the spine. Data on profiles of spine edges of the boards and shapes of the rounding of spines have been gathered by Federici and Houlis (1988) and Grosdidier de Matons (1991); their results are summarized and illustrated in Figure 6.9[g] to [k]. Most byzantine bindings I studied have rounded spines, although in a few cases the front edge has become convex,

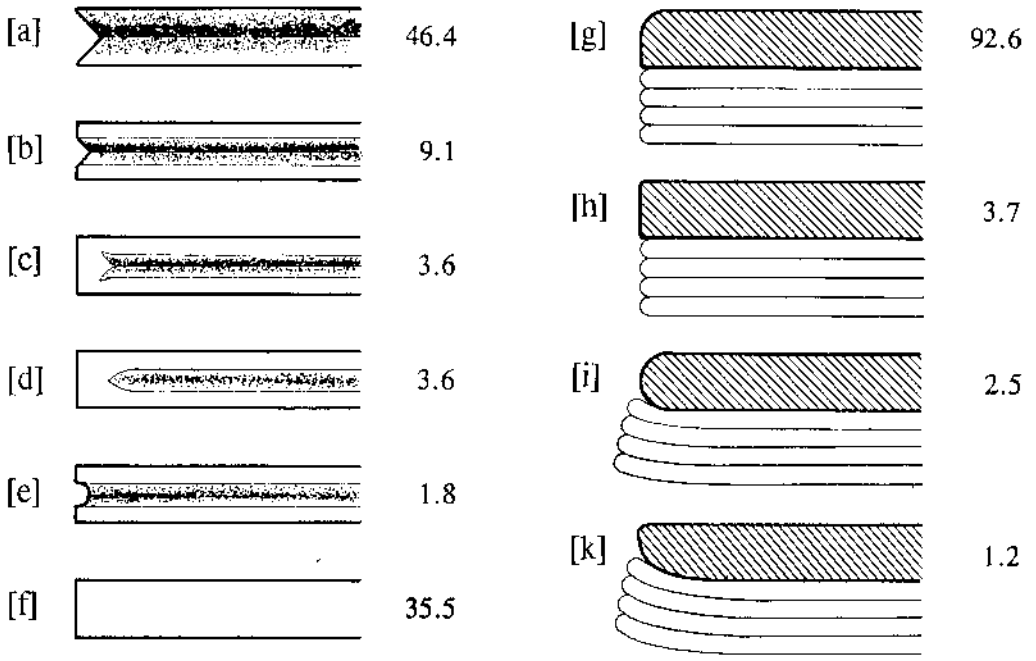

Figure 6.9 Various types of grooved edges [a] to [e] and profiles of the spine edge of boards [g] to [k] as found on the byzantine bindings in the Vatican Library. Modified after Federici and Houlis (1988, figs 19, 20 and 24); the numbers give the relative frequency in percentages.

thus deforming the original rounding of the spine (ONB Cod. Suppl. gr. 1 and Cod. Theol. gr. 223; Cambridge UL Add. 3048). From many examples of boards with their spine edges rounded on both sides (Figure 6.9[i]) I have gained the impression that the shaping of the shoulders was a spontaneous process rather than the result of deliberate backing of the spine.

6.6 SPINE TREATMENT AND TRIMMING

A characteristic feature of byzantine bindings is the spine lining with coarse cloth (often blue) extended onto about one third of the outer face of the board, as likewise employed on late Coptic bindings (see section 3.4) and on ninth-century Islamic bindings (see section 5.3). Usually the edges of the lining can be either felt through the covering or observed in raking light. The adhesive used has not yet been identified, but it is generally assumed to be of starch (Federici and Houlis 1988 p. 33). Its high adhesive power has contributed substantially to the lining's purpose of strengthening the board attachment: very often the hinging thread is already broken but the bookblock and boards are held together by the lining.

After the spine had been lined, the edges of the bookblock were trimmed to receive,

in many cases, writing or decoration. Beside my own scattered observations of score marks by a drawknife on edges of bookblocks (ÖNB Cod. Suppl. gr. 1, Cod. slav. 14, 42 and 57) we have no evidence of how edge trimming was done. Van Regemorter reported edges which are plain, others bearing the title of the book, edges with ornamental drawings in one or more colours and painted edges (1954 p. 9; 1967 pp. 125–6, pl. III). About 70 per cent of the Vatican bindings have plain edges and the remainder stained and ornamented edges with or without a title; out of 34 bindings with title 22 have the title written on the tail edge, 7 on the fore-edge and 5 on the head edge (Federici and Houlis 1988 p. 36, pl. XXXVII).

6.7 ENDBANDS

Characteristically, byzantine bindings have pronounced raised endbands which are worked on supports, usually of cord, occasionally of leather, and extending over the board edges. The supports are anchored with sewing thread through tunnels or holes in or close to the board edge; across the spine edge of the bookblock the supports are tied down through the centrefold of each quire and thus through the cloth lining.

The most frequent type is a plain primary endband worked on usually two supports of cord of equal or slightly different diameter, one sitting on top of the other. It is sewn with the same natural-coloured thread used for sewing the bookblock, wound obliquely around the lower support and vertically around the upper support (Figures 6.10 and 6.11). This type of endband constitutes a structure of great mechanical strength which markedly enhances the stability of the binding. It has been observed by van Regemorter (1954 pp. 9–10, fig. 4a; 1967 pp. 126–8, pl. IVa) and later explained and described by Jäckel (1975 p. 216), Gast (1983 pp. 56–8), Greenfield and Hille (1986 pp. 51–6) and in *Tranchefiles* (1989 pp. 56–7, with different variants). The oblique tunnels for attaching the supports exit either on the inner or (more often) the outer face of the board; alternatively, transverse holes are made or the holes for the board attachment shared. About two thirds of the Vatican bindings have this type of plain primary endband on two supports, the majority with oblique tunnels pointing outwards (Federici and Houlis 1988 pp. 33–5 and 79–81).

Another type of byzantine endband, likewise protruding over the bookblock and extending over the boards, displays a colourful embroidery with a chevron pattern. Adam (1923–4 pp. 32–3, 41–2, fig. a) described it on an apparently genuine byzantine type of binding on a 1492 manuscript by a Cretan scribe working in Venice; van Regemorter (1954, p. 9, fig. 4b) observed it, among others, on Vat. gr. 127 (Greece, s. xiv). This is, essentially, a woven endband like the Islamic one (see section 5.4, Figure 5.5), but worked on a single support extended into the board edges. The support, usually cord, is anchored by a loosely wound thread (as a rule, blank), starting from the transverse holes in the board (Figure 6.12[a]) and continuing across the spine, with tie-downs passing through each quire [b]. These warps are then worked with weft of different colour, resulting in a chevron pattern as the weaving proceeds in the opposite directions ([d] and [e]). The weave structure of the interlacing threads permits endless variations, depending on the number of colours, their sequence and the number of warps passed at a time. After the weaving is

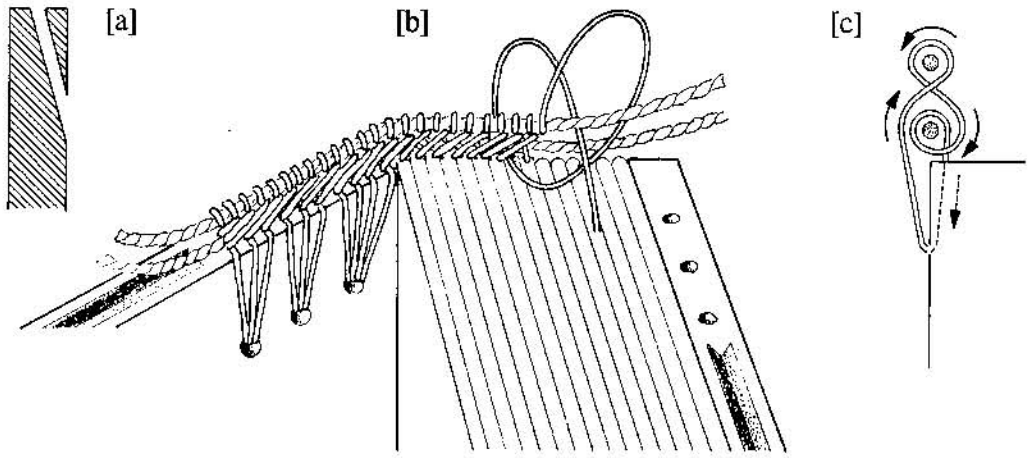

Figure 6.10 Construction of the byzantine primary endband with double support: [a], cross-section of the tunnel for anchoring the thread in the board; [b], process of endband sewing; [c], thread movement in cross-section.

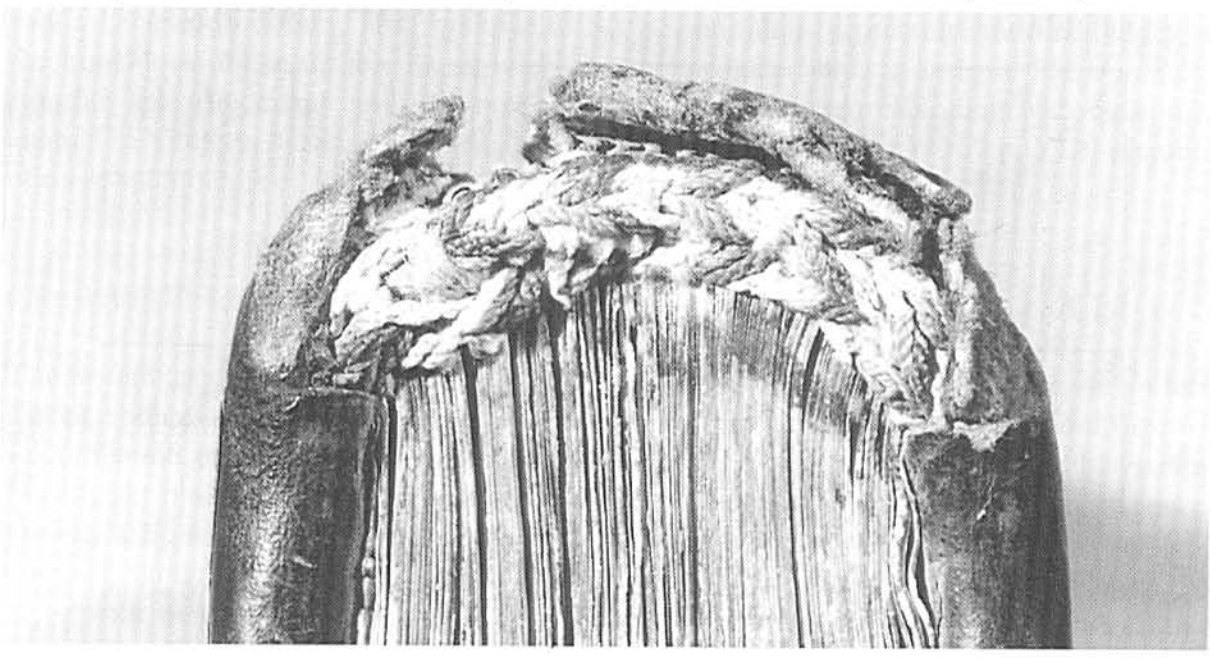

Figure 6.11 Byzantine primary endband. Note the 'cheeks' of the covering that enclose the endband extensions on the boards (Vat. gr. 19, dated 1425; from Federici and Houlis 1988, table VII A).

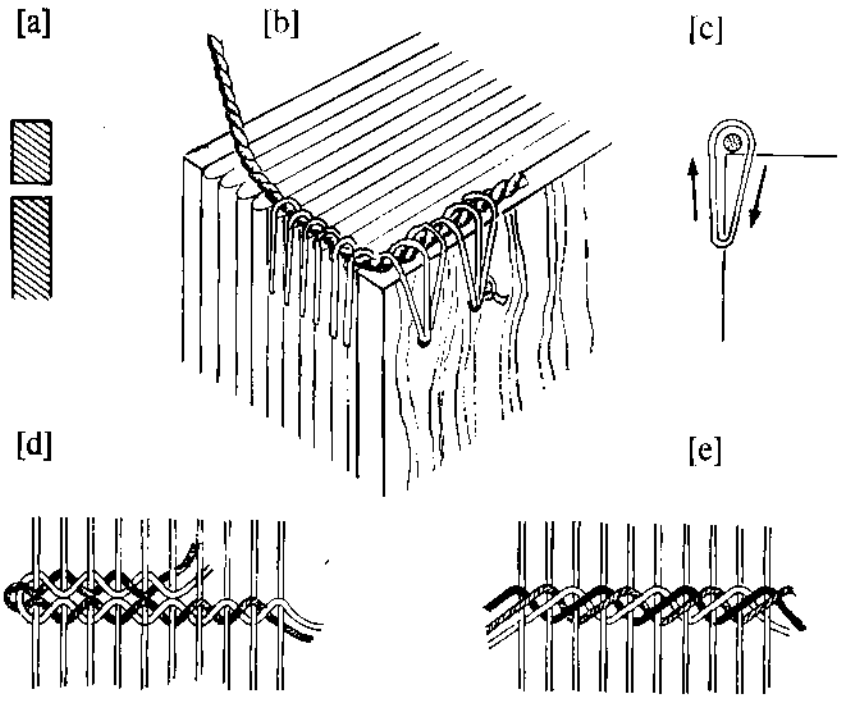

Figure 6.12 Construction of a single-support primary endband with chevron embroidery: [a], cross-section of the board edge with transverse holes; [b], anchoring the cord support with sewing thread and continuing endband sewing through the centrefolds; [c], movement of the sewing thread; [d], the turns of the thread of the primary endband are employed as warps for weaving, two coloured threads form the weft, showing a chevron pattern after the passage is reversed; [e], as in [d] but using three colours, each passing over two warps.

completed, one or more of the coloured threads can be wound around an auxiliary core of thin cord, placed on top of the endband. The working of this type of endband is well illustrated in *Tranchefiles* (1989 pp. 54–5, 76–85), based on Greek, Syrian and Armenian bindings; Figure 6.13 illustrates this type of endband on a Georgian binding.

In the Vatican study of Federici and Houlis (1988) about one third of the bindings (31) appears to have coloured embroidered endbands, 20 of them belonging to the category described above; the remainder are probably 'alla greca' endbands, that is, primary endbands embellished with a Western type of embroidery, such as the 'cross-stitch' and 'renaissance' variety (see section 6.11).

6.8 COVERING AND DECORATION

The majority of byzantine bindings has leather covering; treasure bindings are often covered with textiles and elaborate embellishments with precious metals, gems or carved ivory (see below). According to van Regemorter (1954 p. 10) the leather is usually goat- or sheepskin, and occasionally calfskin, and mostly brown, red-brown and sometimes black. Federici and

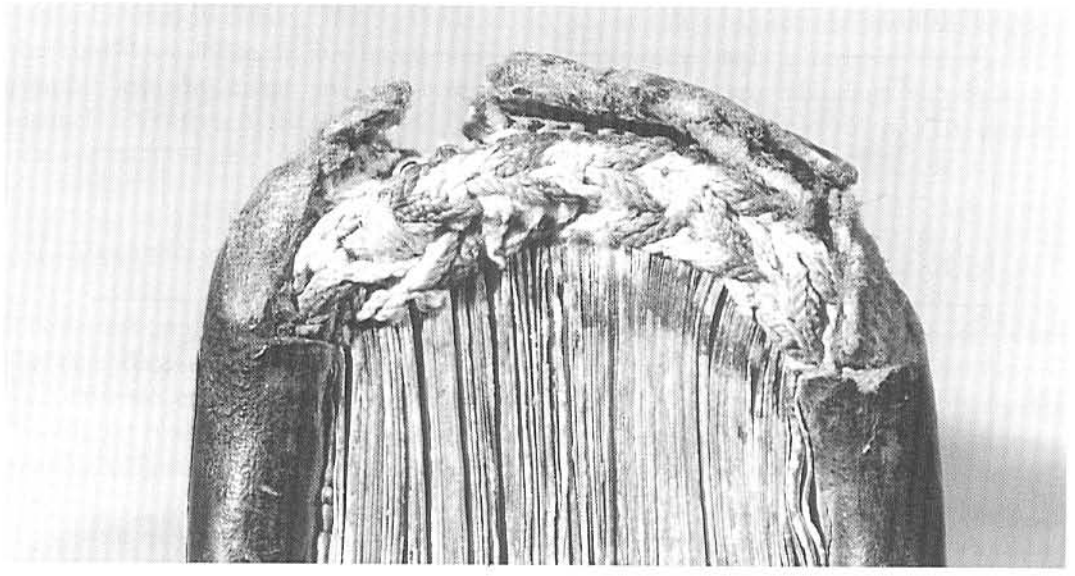

Figure 6.13 Chevron type endband of the Georgian manuscript (Graz UB MS 5208–3, s. x).

Houlis (1988 pp. 35–6) mention goat- and, for simpler bindings, sheepskin; though without factual proof, they suggest that animal glue was the adhesive used for the leather covering. They observed differences in working the turn-ins and corners; mostly the corners were neatly mitred with a single cut, others were overlapping or had two cuts yielding a tongue (Figure 6.14). The edges of the turn-ins in the Vatican material were trimmed out in *c.* 60 per cent and left more or less irregular in the remainder, in *c.* 10 per cent wooden trenails were used to secure the turn-ins to the board; this practice is mentioned by Mokretsova (1995 fig. 4c) on a thirteenth-century Russian codex. Petherbridge (1991 p. 373) noticed turn-ins with V-shaped notches, supposed to have been incised to facilitate the covering operation; his observations are not supported by the Vatican material, yet I noted such notches along the turn-ins of a Serbian codex from Mount Athos Chilandariou monastery (ÖNB Cod. slav. 34, s. xiv/xv), as well as on many Western bindings I studied (see Figure 9.36).

Endbands extending over the board edges require a special treatment during covering: they become a raised turn-in at the head and tail, which continues to form 'cheeks' (see Figure 6.11). Grosdidier de Matons (1991) examined the various ways in which the leather covering was worked around the endband extensions. With some skill the binder would have made a short cut into the turn-in to allow covering the extension; sometimes the inner board edge along the extension was left bare, but usually an extra piece of leather was put in and decorated later with an annular stamp.

The leather coverings of byzantine bindings are virtually always decorated with blind tooling; apparently gold tooling was not used at all and tooled titles are conspicuously absent. Van Regemorter explored the decoration in numerous and well-illustrated studies (1953; 1954; 1959; 1961; 1967). Details concerning the decoration of byzantine bindings

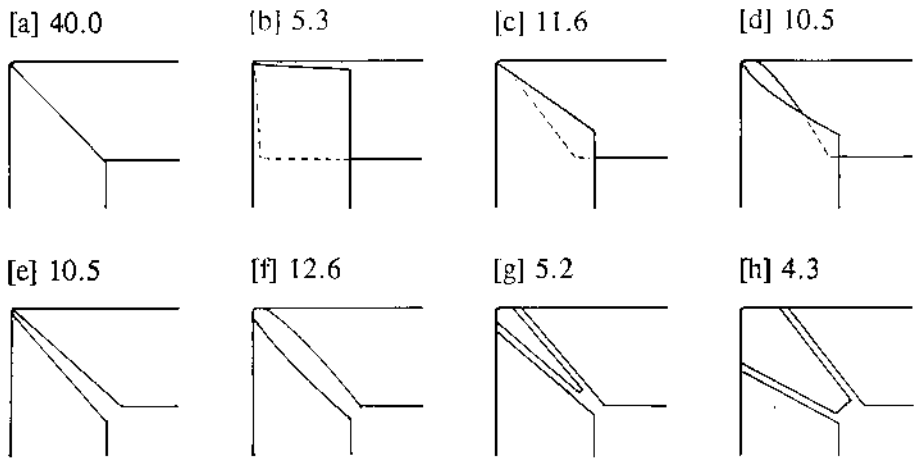

Figure 6.14 Corner turn-ins of the Vatican bindings (the numbers are percentages based on 95 samples; modified from Federici and Houlis 1988, fig. 29).

are further presented by Goff (1975), Irigoin (1982), Grosdidier de Matons (1991) and Sonderkamp (1991); Miner (1957) and Mazal (1970a) are also good sources of illustrations. Federici and Houlis (1988) provide rubbings, a classification of tools used and a suggested typology of ornamental patterns.

Byzantine treasure bindings may have had a basic leather covering, but according to literary sources (Atsalos 1977 p. 22) they were often covered with precious textiles like brocade, silk or velvet. Only a few are extant (Irigoin 1982; Harlfinger et al. 1983 pl. 56; Hunger 1989 figs 9 and 11) and the majority of such, often liturgical, manuscripts has come down to us with their valuable treasure covers robbed or spoilt by countless repairs. The bindings of the 50 magnificent Bibles, made to Constantine's order around AD 330 (Wendel 1939), seem to have perished altogether. Turner (1977 p. 134) lists 19 of the earliest Biblical texts dating from the fourth to seventh centuries AD; among them are the Codex Sinaiticus (BL Add. 43725) and the Codex Vaticanus (Vat. gr. 1209), both dating from the fourth century. The former seems to have been of the calibre of Bibles of the Emperor's order, but its binding was apparently already in a dilapidated state when von Tischendorf (see note 3) got hold of it. When purchased in 1933 by the British Museum, its binding showed evidence of a great number of repairs, such as sewing threads of at least two earlier sewings and overcasting for securing loose leaves, probably done on the latest rebinding on raised cords (D. Cockerell 1936; Milne and Skeat 1938 pp. 82–3, figs 1 and 22).

Many of such treasure bindings, as said before, were entirely enclosed in precious metals, decorated in various ways such as enamelling and embellished with jewels and precious stones. One of the surviving examples is the Mt Sinai St Catherine's monastery Evangeleon (Mt Sinai gr. 207), which is reproduced in a drawing by Petersen (1954 fig. 7) and described in detail by Sonderkamp (1991); this binding (gilded silver decorated with

Biblical scenes in chasing and repoussé work) has side flaps protecting the three edges of the bookblock and a flexible metal back constructed of a knuckle and pin hinge system. Another splendid metal covering, now detached, is of a treasure binding with cloisonné enamel in Venice's Marcian Library, illustrated by van Regemorter (1967 p. VII); pictures of more such bindings are found in Velmans (1979).

6.9 FASTENINGS AND FURNISHINGS

The fastenings of byzantine bindings are of the peg and strap type, similar to those on late Coptic codices (see section 3.7, Figure 3.10). As a rule, the metal pegs (iron and bronze, seldom wood or bone) are driven into the edge of the upper cover and the leather straps (mostly slit braid) are attached through transverse holes along the edge of the lower cover. Usually a book has four fastenings, two at the front edge, one each at the head and tail; however, bindings with only one or two fastenings at the front edge may be found as well as those with as many as 12 (Atsalos 1977). In the Vatican material Federici and Houlis (1988) found one fastening in 24 per cent of the bindings, two in 41 per cent and four in 20 per cent; 14 per cent of the bindings had no fastenings.

Adam (1923–4 p. 78) was the first to describe two types of straps with metal rings (Figure 6.15[a] and [b]). Goff (1975) examined the fastenings on bindings from Mount Athos Serbian Chilandariou monastery and gave some details of the construction of the tripartite slit-braid strap and its attachment; apparently a few straps had still preserved their rings of iron. Complete straps are illustrated in Miner (1957 no. 103). The free unbraided ends of the straps usually traverse the turn-ins and are pasted down onto the inner face of the board, sometimes they are hidden underneath the turn-ins (Federici and Houlis 1988 pp. 38–40).

Confirmation of the original make-up of the metal constituents of these fastenings is provided by various archaeological finds. Three bronze pegs (misinterpreted as amulets) found in Knižaja Gora (Kiev District, Ukraine; see Rauhut 1960) show transverse holes for riveting. Another find from Russia (Khersones, Crimea), dated to the tenth/eleventh century by stratigraphy, contained over two dozen rings and pegs (Mokretsova 1994; see Figure 6.15[c] and [d]); a recent find in the ruins of a church in Wladimir (*c.* 300 km east of Moscow), that was burnt down in 1209, brought to light rings and pegs which evidently belonged to fastenings of the byzantine type.[10]

Byzantine bindings, especially of liturgical works, abounded in exquisite embellishment with precious metals, often enclosing the whole cover, picturing Biblical scenes (see above). It is conceivable that starting from such expensive metal bindings, the flat corner pieces – in literary sources called '*gammatia*' (for their resemblance with the third letter of the Greek alphabet) – and central plaques were the obvious result of the use of cheaper metal furnishings for the bulk of less valuable bindings. The corner pieces are often decorated with the effigies of the four Evangelists or geometrical ornaments and the plaques with a Crucifix (Atsalos 1977); he also found references in medieval texts to the more common bosses, like the almond-shaped '*amygdalai*' or round '*boullai*' of copper, silver or

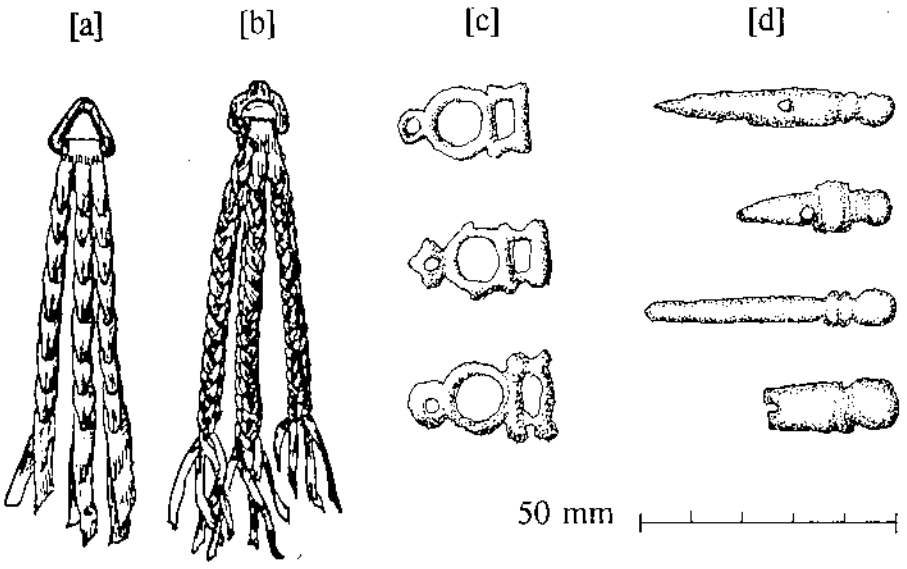

Figure 6.15 Fastenings of byzantine bindings: [a], tripartite slit-braid strap with ring from a binding from Vatopidou Monastery, Mt Athos; [b], triple four-thong braid strap of a Venetian binding from 1492 (probably 'alla greca' type; [a] and [b] from Adam 1923–4 p. 78); rings [c] and pegs [d] from archaeological finds in Kershones (s. x/xi; after Mokretsova 1994). The holes in the pegs are probably for fastening them with rivets (cf. Figure 3.10). Scale applies to [c] and [d].

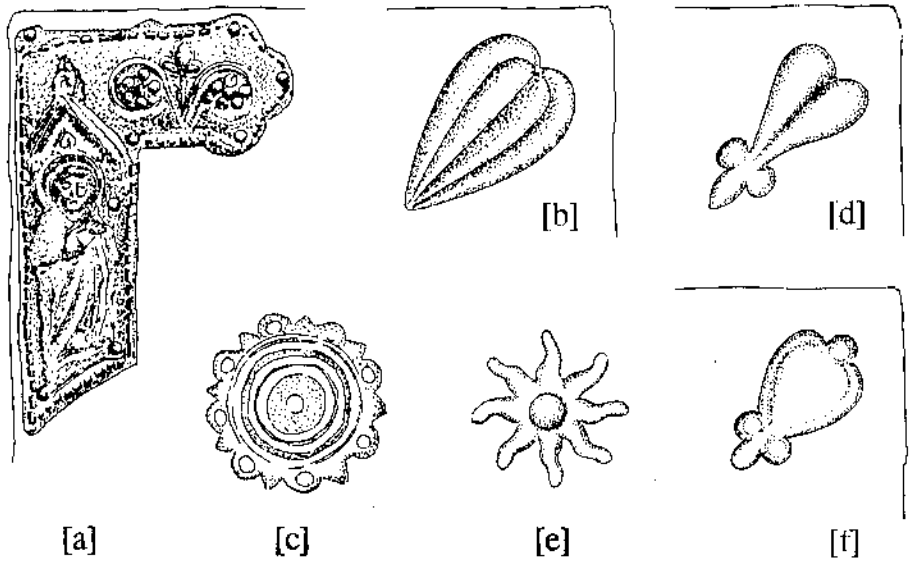

Figure 6.16 Furnishings of byzantine bindings: [a], gamma-shaped corner piece (modified from Laffitte and Goupil 1991 p. 12, fig. 4; BNF Ms. gr. 88, Evangeliary, s. xii); [b], almond-shaped corner boss and [c], round central boss on a Menologeon (Amsterdam UB I D 75, s. xii/xiii); [d] and [f], two variants of corner bosses, and [e], a central boss after van Regemorter (1967 pl. VI; Athens BN MS 629).

gilded silver. In addition, corner bosses may be shaped like a fleur-de-lis, central bosses like a radiant sun (Figure 6.16). Usually the covers are furnished with five metal bosses which may be supplemented with smaller decorative nails in various places; occasionally, the central boss is omitted.

The presence of metal furnishings is far from being a distinct feature of byzantine bindings: out of the 112 bindings of the Vatican study of Federici and Houlis (1988) only 37 had bosses or traces of those. On 21 bindings all five bosses are identical and on another 11 bindings almond-shaped corner bosses are combined with a round central boss. These data are too scant and the material studied too heterogeneous to support van Regemorter's (1967 p. 131) suggestion that the kind of bosses on a binding can give an indication of its provenance. Even though Federici and Houlis' findings, that four out of the five Cretan codices have an identical set of five bosses each and that all Cyprian bindings are devoid of bosses, are indeed very striking, I found two Cyprian bindings (Düsseldorf KM Inv. nos. 16084 and 16085, s. xvi) which did have a complete set of bosses and corner and centre pieces respectively. It could be of significance that none of the nine Southern Slavic codices I studied (ÖNB Cod. slav. 2, 12, 14, 21, 28, 34, 35, 42 and 57) had any furnishings.

6.10 REPAIR AND REBINDING

Old repairs and rebindings are frequently encountered in byzantine codices. Willoughby (1940) reported 10 rebound Greek manuscripts, three of them carrying a written and dated record of the rebinding (the earliest date is from AD 1466).[11] As mentioned earlier, 24 out of the 112 codices of the Vatican collection were found to have been rebound (Federici and Houlis 1988 pp. 9–10). Whereas rebinding always means loss of information about the original binding structure, old repairs may still throw some light on its weaknesses or shortcomings. One of these shortcomings is undoubtedly the insufficient strength of the sewing thread for anchoring the boards to the bookblock, which – to a certain extent – is compensated for by the robust cloth lining. The rebinding of ÖNB Cod. slav. 12 documents that the binder, who had resewn the bookblock on four instead of five stations, did not take the trouble of lacing the sewing thread into the boards: the binder left the V-shaped channels bare and attached the covers to the bookblock solely by the new cloth lining; yet he thought it wise to provide new solid endbands of the cross-stitch type with plain thread. The renewal of endbands seems indeed to have been a common measure to consolidate worn-out bindings: ÖNB Cod. slav. 21 is an example of a re-covered binding with a new but simplified endband at the tail. On Düsseldorf KM Inv. no. 16086 (s. xvi, Evangeleon, Cyprus) I observed that perhaps on more than one occasion the application of a new lining was considered an adequate means of re-attaching the otherwise sound bookblock to the covers. Such details should be observed most carefully in order to assess the originality of a binding; only seldom are repairs and evidence of rebinding as obvious as on the eleventh-century Russian Archangel Gospel, where the old wooden boards show remnants of the original zigzag lacing path along with the new gothic attachment (van Regemorter 1964).

6.11 'ALLA GRECA' BINDINGS

Byzantine binding structures made after the fifteenth century in Europe underwent modifications by adopting technical and decorative typological elements of the Western binder; these were popular among humanists in Italy and France and became known as 'alla greca' bindings. They can be recognized on the basis of exterior aspects only, such as typical Western decoration, often including gold tooling; yet often they also have Western structural elements such as supported sewing or renaissance endbands. Any binding from the end of the fifteenth century or later that exhibits Byzantine traits should be treated with some suspicion in this respect. This may apply even to the Vatican study of Federici and Houlis (1988), in which about one third of the material belongs to the sixteenth century or later; they mention indeed simplified endbands, '*in alcuni casi al capitello latino*', one of the characteristics of the 'alla greca' bindings.

From archival data cited by De Marinis (1960 vol. 1 pp. 31ff.; vol. 2 p. 45) it is clear that in Italy the term 'alla greca' was in use by the second half of the fifteenth century: documents dating from 1455 to 1499 clearly distinguish bindings with '*une serratura greca*', '*libri ala grechessa*' and '*legate alla greca*' from those of the kind '*ligatum more latino*'. A bill made out for four bindings of either type, '*doy in grecho e doy non grechi*' proves that the same workshop could handle either technique; the specification that '*sei volumi greci* [should be bound] *ala grecha*' attests the early humanists' traditional preference to have classical Greek texts bound accordingly. In his chapter on 'alla greca' bindings De Marinis (1960 vol. 3, pp. 36–49) lists 225 examples from Italy of the fifteenth and sixteenth centuries (*c.* 15 per cent and 85 per cent respectively); Venice and Rome are the most frequent places of origin. The 'alla greca' vogue had equally caught on in France, where the royal libraries of Francis I and Henri II at Fontainebleau assembled a rich collection of no less than 600 Greek works bound 'alla greca', now in BNF (A. Hobson 1989 pp. 172–212). Humanist collectors far and wide followed the fashion: members of the Fugger family in Augsburg had their Greek books bound in Paris, Venice and also in Germany, and Cardinal Granvelle, even if he knew no Greek, made sure that the Greek texts received an appropriate binding (probably from Italy; see Piquard 1942; 1951).

In the literature 'alla greca' bindings have attracted attention mainly for their decoration; data on their binding structure are scarce. Their smooth backs suggest that the sewing is recessed, analogous to the link-stitch sewing lodging in V-shaped grooves in byzantine bindings. Indeed V-shaped nicks are the rule and are thought to have been produced by a saw, possibly a kind with teeth with triangular cross-section (the terms '*grecque*' and '*grecquage*' testify to the origin of the procedure); yet, instead of a link-stitch sewing the grooves may hide a Western type of all-along sewing on two thin recessed cords. This method is briefly mentioned by Vezin (1973) and described in greater detail by C. Adam (1984 pp. 37, 117–18), see Figure 6.17.[12] I myself have not seen this type of sewing among the few 'alla greca' bindings I have studied, such as six Granvelle bindings (Amsterdam UB I A 14 to 17; Leiden UB Sca. 15 and Voss. Graec. 45) and Amsterdam UB 1717 B 5, a 1520 Florence imprint; all of them have unsupported link-stitch sewing, three with a clearly visible zigzag attachment (the others unidentifiable). The

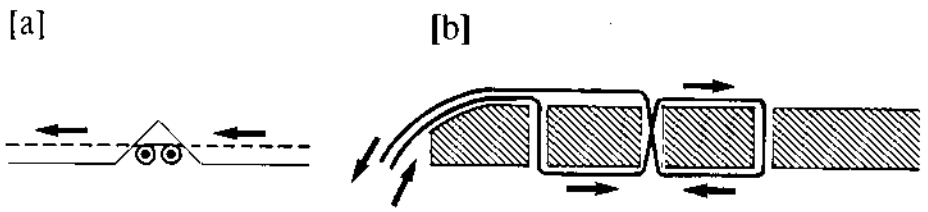

Figure 6.17 Supported sewing on 'alla greca' bindings: [a], sewing on recessed double cords (modified after C. Adam 1984 p. 40); [b], lacing of the cords through three transversal holes in the board (after a model by C. Adam).

fact that this small group of samples happens to be of Italian origin does by no means suggest that Italian 'alla greca' bindings would have unsupported link-stitch sewing in preference to recessed-cord sewing as seen in France: it rather indicates our need for detailed studies in this area.

The endbands on 'alla greca' bindings are possibly a more reliable way of distinguishing them from their genuine byzantine predecessors. Though they likewise protrude from the head and tail edge of the bookblock and extend onto the board edges, they may differ in their construction and secondary embroidery which shows a great number of variants. The base is usually a primary wound endband with a single support of cord, which is anchored with sewing thread through transverse holes in the board and tied down through the quires; the thread follows a figure-of-eight course (Figure 6.18[a] to [c]. The two main types of secondary embroidery are the cross-stitch type which often uses alternating colours in as many as eight or ten strands [d], and the renaissance embroidery, usually worked with two colours of single or double thread [e]; either type can include one or more auxiliary cores. Both types of embroidery were apparently favoured by Western binders who had already employed them on romanesque and gothic bindings (see Figures 8.16[f], 9.24 and 9.25) and were perhaps unfamiliar with the complex byzantine weaving. The occurrence of the secondary embroidery of the cross-stitch type [d] was noticed by van Regemorter (1954 pp. 9–10, fig. 4c; 1967, p. 128, pl. IVb), mainly in Athens collections (Athens BN MSS 347, 650, 978 and 2610); Jäckel (1985) observed them often on bindings from Serbian monasteries, which accords with my finding on several Serbian manuscripts in Vienna ÖNB (Cod. slav. 2, 12, 14, 35, mainly s. xvi). In the Vatican survey (Federici and Houlis 1988) this endband type was found in five cases; several examples are also given in *Tranchefiles* (1989 nos. 20 to 22).

Renaissance-type embroidery was noticed by van Regemorter (1954 pp. 9–10, fig. 4d) on bindings in Athens BN and in the Vatican Library; Jäckel (1961; 1975 and 1985) termed it the 'Fugger-type', since he observed many of them on Greek and Hebrew books from the library of the Fuggers (examples: BSB Cod. gr. 82, Cod. hebr. 29). The construction is described by Gast (1983 pp. 56–7), and several variants, often combining both the cross stitch and renaissance elements, are illustrated in detail in *Tranchefiles* (1989 nos. 23 and 24). The endbands on the Granvelle bindings mentioned above are of this type, worked in one (crimson) or two (crimson and yellow) colours (Figure 6.19).

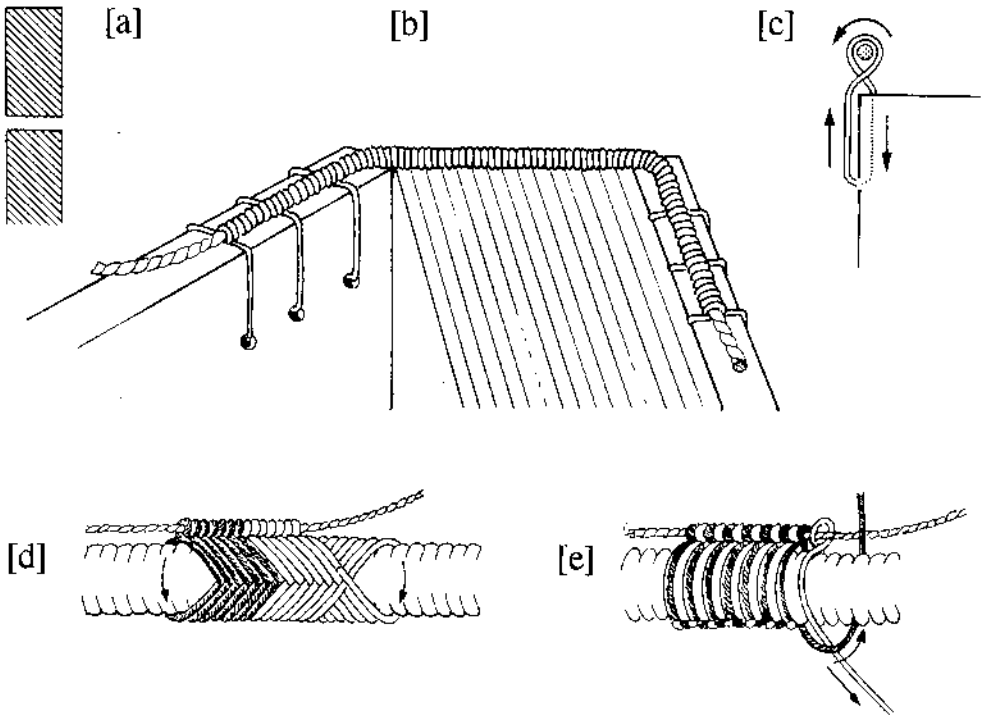

Figure 6.18 Construction of a single-support primary endband with secondary embroidery: [a], cross-section of the tunnel for anchoring the thread in the board; [b], endband sewing across the bookblock (extra turns of the thread are made for fuller packing); [c], thread movement in cross-section; [d], secondary embroidery of the cross-stitch type with an auxiliary core; [e], secondary embroidery of the renaissance type.

'Alla greca' bindings have wooden boards with the characteristic grooved edge and are cut flush with the bookblock. The edges of the bookblock are carefully trimmed and, as a rule, they are gilt and gauffered, a feature notably common in royal and aristocratic bindings of the sixteenth century. Edge gilding was apparently carried out after the boards had been attached and the primary endbands sewn – a method somewhat strange to the modern binder. In several instances I found evidence of this peculiar method in the form of remnants of gold on primary endbands and/or neighbouring parts of the edges of the boards on several of the Granvelle bindings (Amsterdam UB I A 14, 15 and 17), on several Aldine imprints from between 1487 and 1527 in both Italian and French bindings and on the chemise binding The Hague KB MS 135 J 55 (*c.* 1460, Spanish [?]; see Storm van Leeuwen 1989 note 21). For details of edge gilding techniques see section 9.6.

Most 'alla greca' bindings are covered with goat- or sheepskin or the skin of any hair sheep variety and only a few with calf; the colour is usually red or brown, olive, green or black. Whereas byzantine bindings are generally tooled in blind, 'alla greca' bindings display more or less elaborate gold tooling, combined with blind lines, colourful leather inlays or painted interlaces and background stippling in gold; the smooth back often also

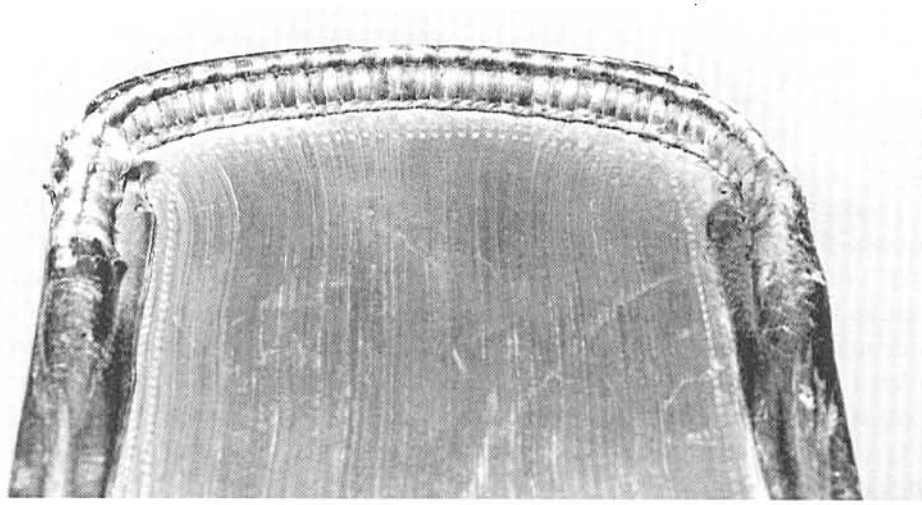

Figure 6.19 Endband on an 'alla greca' binding (Amsterdam UB I A 15, Granvelle binding on Photius, s. xvi).

received similar decoration (for technical details see section 9.10). The style was 'Western', making use of renaissance ornaments and elaborate arabesque linear compositions. Some characteristic Italian 'alla greca' bindings are given in De Marinis (1960 vol. 3), a number of French royal bindings is illustrated in A. Hobson (1989), various other examples in Geldner (1958, nos. 67 and 69), Needham (1979 nos. 58, 59 and 63) and Arnim (1992 nos. 41 and 42).

Fastenings of 'alla greca' bindings are true copies of earlier byzantine precursors. Accordingly, the bronze pegs of the, usually four, fastenings are fitted into the edges of the upper cover and the slit braid (mostly tripartite) straps threaded through the lower cover. Only occasionally did binders who were perhaps unfamiliar with the slit-braid technique employ ordinary four-thong braiding (see Figure 6.15[b]). Protective furnishings found little application, except in the case of the French royal bindings which had usually received four bosses on either cover; moreover, these bindings – to protect their raised endbands – were regularly fitted with bronze heels ('*sabots*') on the tail edge of the boards (see C. Adam 1984 p. 117).

6.12 ARMENIAN BINDINGS

Armenia was the very first country to have recognized Christianity as the official state religion, even before Constantine's decree of AD 313 which granted it toleration in the Byzantine Empire. The Bible and Patristic works were translated into Armenian in the early fifth century, and there is no reason to doubt that Armenian bookmaking adopted the craft as practised by the early Coptic and Byzantine binders. Yet there seems, in spite of many

similarities, to be a significant and surprising difference: whereas virtually all Mediterranean binding traditions were based on unsupported link-stitch sewing, the Armenian book made use of supported sewing. But it must be emphasized that, possibly due to the turbulent political history of this area which has witnessed numerous conflicts, only very few Armenian codices from the early medieval times came down to us and much evidence is of later date.

Van Regemorter (1953) devoted a brief article to Armenian bindings, outlining their general characteristics: she noticed the hinging of the boards with loops of thin cord but assumed that they had been sewn with the link-stitch technique like byzantine bindings. In her 1967 essay (pp. 123–24) she had come to revise her opinion and stated that Armenian bindings were sewn with herringbone sewing on double supports of cord. She further suggested that sewing began with anchoring the cord by folding it double, lacing it through a hole in the board and fixing it with a slip knot; after the sewing was completed, the two support ends would follow the same path and be knotted (see Figure 6.20). Symon (1981) observed thin double supports on Armenian bindings and briefly recorded their main features; Greenfield (in van Regemorter 1992 pp. 68–70) confirms the use of double supports on the binding of an Armenian manuscript (New Haven Yale UL MS 443, s. xvi/xvii) and provides new data on variants of the V-shaped sewing holes.

A substantial contribution to our knowledge of sewing structures and many other details of Armenian bindings are the result of the dissertation research of Merian (1992a; 1992b; 1993) comprising 167 manuscripts dating predominantly from the thirteenth to the eighteenth centuries. Regrettably more than half of them are rebindings, the earliest original binding being from AD 1321. Merian's study has firmly established that Armenian bindings employed double sewing supports of thin cord, usually recessed in V-shaped grooves. The support cords were attached by means of hinging loops, anchored through single transverse holes in the board at *c.* 10 to 20 mm from the spine edge. There are mostly three or four sewing stations equipped with two cords each, but in some cases the supports at the intermediate sewing stations have four cords. The supports are anchored in the board at which the sewing begins; after finishing the sewing the two cord ends pass through the hole in the second board and are knotted at the edge (Figure 6.20[a]). Most sewing holes (over 80 per cent) are V-shaped cuts, but they may also be round, square or W-shaped; notably the latter occur at intermediate stations with heavier supports and appear frequently on bindings from the sixteenth/seventeenth century.

The sewing of Armenian bindings is of the herringbone type (see section 7.4) with very likely a β-type of linking (see Figure 2.1[b]). An outstanding feature is the regular occurrence of the supported herringbone at the change-over stations: Merian (1993 p. 47) points out that there 'were usually no unsupported kettle-stitches',[13] but fails to elaborate on the thread movement of the somewhat unusual 'herringbone change-over'. Model experiments made it clear that doubling the β-type of linking at the change-over stations would produce the desired configuration (Figure 6.20[b] and [c]); however, the question whether this was the method used by the Armenian binder remains open. It should be noted that a similar 'herringbone change-over', that is, absence of the usual unsupported climbing link stitch, also occurs on romanesque bindings (see section 8.5).

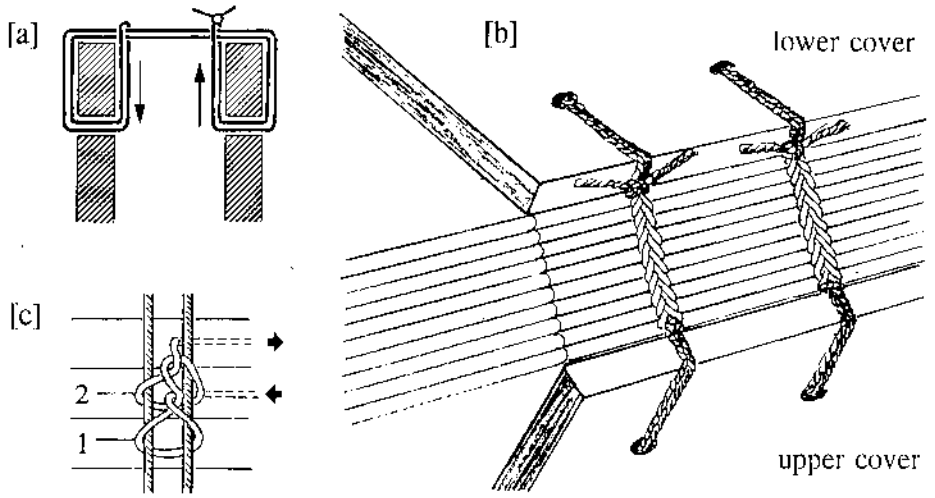

Figure 6.20 Diagram showing the Armenian binding structure: [a], lacing the sewing support of double cord; [b], herringbone sewing of the bookblock; [c], the thread movement at the change-over station, where the first link (1) is repeated (2) before entering the next quire.

Most of the bindings in Merian's study have wooden boards, flush with the bookblock, usually of a thickness of no more than 2 to 5 mm and predominantly (over 80 per cent) with the grain running horizontally; this orientation of the grain direction could have been chosen because of the susceptibility to splitting of the thin boards along the hinging holes in the spine edge (Merian 1993 pp. 40–3). Armenian bindings, unlike most byzantine bindings, have no grooved board edges.

Analogous to byzantine bindings is the lining of the spine with a coarse cloth extending onto the outer face of the boards, and the construction of the raised endbands, which is based on a single support of cord (sometimes rolled leather), anchored into the board, *c.* 20 to 30 mm from the edge (see Figure 6.12). The secondary embroidery has a chevron pattern usually in three or four colours (for details of these constructions see *Tranchefiles* 1989 nos. 25, 26 and 29). Greenfield and Hille (1986 pp. 57–64) propose another embroidery on several cores, but are uncertain whether this was the genuine method. The smoothly trimmed edges of the bookblock are usually coloured, often in a plain red-brown (Armenian bole?), or patterned; the coloured edges at the head and tail stop short (*c.* 10 to 20 mm) of the spine, thus leaving a horseshoe-shaped area blank in front of the endbands.

Before covering, the inner face of the boards is lined with fabric, usually patterned, overlapping the joint by *c.* 10 to 15 mm. As this fabric is finer than that used for the spine lining, it often allows the attachment loops underneath to be discerned. The covering material most frequently encountered in Merian's study was goat- or calfskin, commonly brown or reddish; the turn-ins are carefully trimmed and pasted over the textile lining. In order to facilitate the covering around the raised endbands, the turn-ins were incised and usually

fastened with trenails. The corners of the turn-ins are neatly mitred. After covering, a separate fore-edge flap is attached to the front edge of the lower cover: it is made from the same leather as the covering and lined with the same fabric; the flap covers exactly the fore-edge of the bookblock (in two cases only pentagonal flaps of the Islamic type were observed).

Usually Armenian leather bindings – inclusive of the fore-edge flaps – have blind-tooled decoration composed of lines and individual stamps (rope-work, chenille and rosettes not unlike Islamic stamps); the most frequent designs are the rosace, intersecting squares or triangles enclosed in a circle and the stepped cross ('Calvary cross') built from rope-work or chenille stamps (Merian 1993 pp. 67–76). The smooth backs very often carry parallel blind-tooled vertical lines, possibly with the aim of making the back more pliable and thus easing the opening of the book. More luxurious bindings have decorative metal pieces like crosses, full-scale silver plaques, corner pieces and various metal studs. Sometimes enamel and precious stones are also employed (Merian 1993 pp. 80–9). Several Armenian bindings with metal decoration from the fifteenth to the seventeenth centuries are illustrated in van Regemorter (1961 pl. 9–12).

The majority of Armenian bindings has fastenings of the peg and strap type. They comprise two or three wooden or metal pegs, fitted on the upper cover *c.* 10 to 30 mm from the front edge, and leather straps, fastened in the corresponding position at the edge of the lower cover. The leather straps reach over the front edge of the book and with their commonly punched or slit ends hook onto the pegs. Only on more elaborate bindings are the straps of fabric and provided with metal rings to lock onto the pegs. It should be noted that this construction is a close analogue of the long-strap fastening of romanesque and early gothic bindings (see sections 8.11 and 9.11).

The use of sewing supports is exceptional among byzantine bindings and unique in the whole Mediterranean binding tradition. Merian proposed (1993 pp. 179ff.) that the sewing support was introduced to the Armenians in Cilicia through the contact they had with the Western world during the Crusades.[14] She refers to political and trade connections with Europe, even to efforts to reconcile the Armenian Church with Rome. Moreover, Merian presents evidence of manifold cultural exchanges that Armenia had with the Latin world, which, at that time, had already developed the codex with the exclusive use of supported sewing (see section 7.2). The analogy between the carolingian sewing support and that found on Armenian bindings is indeed striking: they share the use of double cords, anchored into one of the boards which serves as the base of a 'sewing frame', and the single-hole Armenian attachment is virtually identical with the carolingian attachment Type III (see section 7.3, Figure 7.11). All this does support Merian's suggestion of Western influence on Armenian bindings, and one can only hope that contemporary original bindings will turn up to provide definite evidence.

NOTES

1. A concise summary of the Byzantine book culture is provided by Hunger (1989); *The Christian Orient* (1978) gives a clear outline of the basic facts of Christian Churches in the East.

2. The term 'Post-Byzantine', employed but not defined by Petherbridge (1991), is not used since a strict chronological borderline is inconvenient when dealing with bindings which are seldom exactly dated.
3. The story of the salvage from the waste-basket of the already incomplete remnants of the magnificent fourth-century Codex Sinaiticus at St Catherine's monastery is recorded in detail by von Tischendorf (his most easily accessible work is an English version from 1935); a very readable account of the adventurous history of the codex until it reached the British Museum is given by Deuel (1966 pp. 262–302). Many examples of the utter neglect of libraries in monasteries in the Near East have been witnessed by Curzon in the first half of the nineteenth century (1849; latest edition 1986).
4. Paul Adam (1849–1931) was appointed restorer to the newly founded 'Zentralgewerbemuseum, (now Kunstmuseum) in Düsseldorf in 1886. He had to cope with a heap of Oriental bindings and detached covers that had been purchased from Dr Franz Bock, a canon who had become dealer in antiquities (and possibly in forgeries). Bock had gathered them on several travels to the East, but seldom recorded provenances. When screening the accession registers of the Kunstmuseum I found that parts of the oriental collection originate from Mount Athos monasteries, Cyprus, Turkey and Persia.
5. Van Regemorter studied bindings in many libraries in Europe and the Near East, for example in Alexandria (Library Patriarchate Orthodox Eastern Church), on Mount Sinai (St Catherine's monastery), Istanbul (Topkapi Museum), in Athens (National Library), Belgrade and Zagreb, Milan (Ambrosiana), Venice (Marciana), the Vatican Library, Paris (Bibliothèque Nationale), Oxford (Bodleian Library) and Dublin (Chester Beatty Library). The shelf-marks of about 120 bindings she studied have been gathered by Greenfield (van Regemorter 1992 pp. 317–22).
6. I have studied *c.* 25 byzantine bindings in the collections of Amsterdam UB, Oxford Bodley, Cambridge UL, Graz UB, Wolfenbüttel HAB, Düsseldorf KM, New York PML and Vienna ÖNB.
7. In her description of method 1 van Regemorter (1954 p. 6) uses the expression '*couture à unique allant de la base du cahier à la tête*', which Petherbridge (1991 p. 395) misinterpreted, assuming that the thread moves up to the very head and tail edge and thus runs the risk to 'be cut off during trimming'.
8. Van Regemorter's authority prompted several attempts to reconstruct her sewing method 2. Irigoin's model (1981 p. 25, fig. 9) realizes the 'two-on' pattern but forms link stitches at the terminal stations only; Greenfield (van Regemorter 1992 p. 102) illustrates a somewhat similar structure but omits the link stitches altogether. I managed to make several variants with link stitches with rather asymmetrical chain structures, too awkward to work and unlikely to be used by an efficient binder.
9. The diameter of the sewing thread can be determined by either optical means or a calliper; the direction of twist (S or Z) and tightness can be established by the naked eye. In order to determine the number of yarns of a plied thread or to find out whether such threads are single- or re-plied, will require access to a free end. A thread's structure is recorded by enumerating the successive directions of twist and is represented in a formula that comprises the number of components in lower case and the final twist in a capital S or Z; accordingly, a single-ply thread of two s-spun yarns in a final Z-twist is recorded as 2s-Z (for terminology see Emery 1966 pp. 8–14). There are no non-destructive methods available to distinguish between flax and hemp; the drying-twist test (*Textile Institute* 1985 p. 225) can be scaled down and carried out under a low-power microscope, but it requires a sample of a number of elementary fibres of 20 to 30 mm length.
10. Personal communication by Dr Inna Mokretsova (her letter of February 20, 1996).
11. At the time of the publication of Willoughby's article the understanding of byzantine binding structures was very limited, which could explain some obvious misconceptions. The statement that 're-sewing was done with linen threads that were used to form cords, and as such were laced into the boards' in the case of the 1466 rebinding of Chicago UL MS 130 seems questionable: it probably was the usual link-stitch sewing and board attachment using the sewing thread. It also explains why the author saw it as a peculiar feature that the back of the binding 'was left entirely flat, without apparent formation of the leather against the raised cords'. Also the 'anchoring of the head-band into a trench [on the board edge] was a very unusual arrangement' to him, indicating that he had no understanding of the construction principle of the raised byzantine endband.
12. I owe thanks to M. Claude Adam, restorer at Paris BNF, who explained to me that it is not a herringbone but a straight sewing on very thin double cords, and who provided me with a model of the type of board attachment he had observed on French sixteenth-century 'alla greca' bindings (his letter of 4 August 1987).
13. The term 'kettle-stitch' or 'kettle' is the Western binder's term for the chain of link stitches which connect the quires at the head and tail with the various types of supported sewing, equivalent to the German *Fitzbund*, the French *chainette* and the Italian *catenella*; its use here is avoided since it interferes with a precise distinction of the various types of change-over.
14. Territorial expansion of the Seljuk Turks forced large groups of Armenians to seek refuge elsewhere; this

resulted in, among other things, the foundation of the Kingdom of 'Lesser Armenia' in Cilicia. It occupied this strategic region from c. 1081 to 1375 and maintained cultural and trade contacts with Europe. The geographical region was passed through by the First (1096–99) and Third Crusades (1189–92).

Part II The medieval codex in the Western world

Introduction

One of the distinctive features of the multi-quire codices discussed in Part I was the use of link-stitch sewing: with its countless variants a strong and long-lasting connection between the quires of a bookblock and an unrestricted book function were achieved. Yet, as has been pointed out (Szirmai 1990–1; 1991a; 1992a, c, d; 1996), this highly successful principle had two major shortcomings. First, the tendency of the spine to become concave, leading to sagging of the fore-edge, already acknowledged in Islamic bindings by contemporaries in the twelfth century, who suggested rounding the spine to prevent this; secondly, the board attachment by means of the sewing thread which often proved too fragile to withstand the strain on the joints, improved upon by doubling the thread in the first and last quire, increasing the number of hinging loops and employing a spine lining of cloth extending over the outer face of the boards.

The first major development towards strengthening the board attachment was achieved with the introduction of a new structural element: the sewing support, intended to serve as an intermediary between the bookblock sewing and the boards.[1] The sewing support seems to have been a Western invention (section 7.2): there is no evidence that it had predecessors in the Mediterranean realm, apart from the late medieval Armenian bindings (section 6.12), and there, the use of sewing supports is more likely to have been the result of Western influence (Merian 1992b; 1993). Except for this Armenian peculiarity, Byzantium and the Islamic world continued to rely on the unsupported link-stitch sewing far beyond the fifteenth century, even though Western binders had already begun to use the sewing support in the eighth century. Evidently, two different construction principles coexisted for centuries in distinct geographical regions. This raises the intriguing question of the interaction between Mediterranean and Western bookbinding traditions. Despite unmistakable evidence of manifold influences of the Byzantine culture on the Western world, there is hardly any trace of a direct impact from Byzantium or Islam on the craft of bookbinding in those early times, except for some strange parallels in technical details of a carolingian board attachment (section 7.3). Only later, in the fifteenth century, do oriental influences appear, as on the 'alla greca' bindings (section 6.11) and in various techniques of decoration (section 9.10).

Neither is there any clue in those unique examples of link-stitch sewing in the seemingly and generally claimed first examples of Western bindings, for no good reason designated as 'predecessors' (G.D. Hobson 1939 p. 218). The most famous is the little volume of the St Cuthbert Gospel of St John, virtually intact, known as the Stonyhurst Gospel (BL Loan 74), ascribed to the end of the seventh century. It miraculously retained its original binding as a buried object in the coffin of the Bishop at Lindisfarne,

Northumbria. Not only has the history of this book been the subject of several detailed studies (Battiscombe 1956; Brown 1969), but fortunately also its binding, meticulously described and photographed by experts like Roger Powell and Peter Waters (in Brown 1969). The brief account below is mainly based on their records, augmented with van Regemorter's (1949) and my own observations.[2]

The small codex (138 × 92 mm) comprises 12 parchment quires, sewn on two pairs of sewing stations with slightly V-shaped slits; close to the tailmost station are two tiny holes *c.* 4 mm apart, probably vestiges of quire tacketing. The sewing thread is anchored to the *c.* 3.5 mm thick birch boards through single holes which are found at a few millimetres from the spine edge. On first examination, Powell (1956 p. 365) proposed that the sewing was carried out according to pattern [g] in Figure 2.1, the thread passing each fold once; later Powell and Waters (1969) retracted the first proposal and settled on pattern [k] in Figure 2.1, which accords with my own observations. The bookblock is sewn with an apparently four-ply and very loosely S-twisted thread. There are primary endbands of the link-stitch type (see Figure 3.6[a]), anchored to the boards in single holes.

Whereas the sewing of the Stonyhurst Gospel is evidently rooted in the Coptic/Ethiopian/Byzantine tradition, the decoration of its red-brown goatskin covering undoubtedly reflects Islamic influence, as a number of ninth-century Islamic covers of the Kairouan find are decorated similarly (Marçais and Poinssot 1948 pp. 228–43, pl. xxv–xxviii; Miner 1957 p. 22, pl. XIII; see section 5.5). The upper cover carries a relief figure moulded over glued-down cords, resembling a kind of foliage of symmetrical figure eight loops, which was thought to refer to John 15:5 'I am the vine, ye are the branches' (Brown 1969 p. 21). The covers are further decorated with indented blind lines, which are in part so deeply scored that they have been taken for incisions; hence, for a long time the binding rated among the first examples of the cuir-ciselé technique (Loubier 1926). However, Powell (1956 p. 370) finally dispelled this misconception and rightly concluded that there was 'certainly no intentional cutting'.

The book is unique in its combination of structural and decorative elements, which is unknown in any other contemporary Western binding; it is one of a few enshrined books which also happen to contain St John's Gospel, such as BNF MS lat. 10439 from the tenth-century shrine of Ste Chemise in Chartres (Brown 1969 pp. 30ff.; Vezin 1992). Admittedly, these features make it difficult, if not impossible, to place the Stonyhurst Gospel in a wider context, but there is certainly no good reason to ascribe to it any prominent role in the evolution of the Western codex.

Much in the same way the three Codices of Bonifatius (Fulda HLB Cod. Bonifat. 1 [Victor codex], 2 [Ragyndrudis codex] and 3 [Cadmug codex]) have been praised as the 'predecessors' of European leather bindings (Loubier 1926 pp. 66–8, 83; G.D. Hobson 1939 p. 218; for data on the Bonifatius codices see Scherer 1905, Köllner 1976 and Hausmann 1992).

The Victor codex is a substantial volume (286 × 127 × 86 mm) of 51 quires and contains a Diatesseron; it was written probably for Victor, Bishop of Capua, between AD 541 and 554. Its decoration, partly misinterpreted by Scherer (1905 p. 11), exclusively occupied the attention of bookbinding scholars for decades (section 7.1), until Endres

(1942) and Wilson (1961) found proof of a carolingian binding structure with a typical carolingian board attachment (section 7.3); however, evidently the carolingian binding was already a rebinding which had destroyed any traces of the original binding. Although its silver furnishings seem to be eighth-century Northumbrian work, which could point to the origin of the binding, it has also been considered as a product of Northumbrian hands working in Fulda.

The Ragyndrudis codex is a manuscript of theological miscellanea written in about the first half of the eighth century in Luxeuil; it has 20 quires and measures 284 × 190 mm. Its covers are badly damaged, according to the legend, by the Frisian sword which put an end to St Bonifatius' life in AD 754. It was completely rebound around 1700 but its covers, due to their unique decoration, were spared and left underneath the new covers. The original covering consisted of a tracery of red goatskin, put over a second layer of leather covered with gold leaf, a common technique known to the Coptic binder (Adam 1911a; Loubier 1926 pp. 66–7, fig. 64; G.D. Hobson 1939 p. 215, pl. II B; Haseloff 1978). The original sewing was probably of the link-stitch type. In the course of recent restoration work (Ritterpusch 1982) four sewing holes were found in the centrefolds; imprints of sewing thread between the first and second and the third and fourth hole seem to be evidence of an earlier link-stitch sewing on paired stations.[3] This conclusion is further supported by van Regemorter (1948) who observed holes in the boards, corresponding to four sewing stations and probably used for the attachment of hinging loops.

The Cadmug codex is a small volume of 125 × 102 mm, containing the Four Gospels written by the Irish monk Cadmug in the eighth century; it is one of eight extant Irish pocket gospel books (McGurk 1956), possibly the only one in its original covering. Again, its decoration aroused great interest and is considered another early example of the cuir-ciselé technique (Scherer 1905 p. 34; Loubier 1926 p. 67; van Regemorter 1949; Köllner 1976 p. 215; Schmidt-Künsemüller 1980 p. xi; Foot 1991 p. 20).[4] Because of similarities in the sewing thread, the wood of the boards ('*bois satiné*') and the type of leather ('*même cuir rouge non teint*'), van Regemorter (1948) assumed a close relationship to the Stonyhurst Gospel: '*Ces deux volumes sont frères et je les considère, tous deux, comme northumbriens avec influence de technique méditerranéenne*'. Yet her conclusion is far from being substantiated, as the sewing is unidentified and the binding substantially restored.[5]

If any binding could truly claim to provide any clue to the very beginnings of the Western binding structure, it would be a plain ninth-century codex from the Abbey of Reichenau (Karlsruhe BLB Reich. 233, *Commentarius in Epistolas canonicas*, 228 × 145 mm). It escaped rebinding in the major refurbishing operation in 1457, but was later ruthlessly butchered and rebound in 1972; no original constituent was kept and no record written. However, a photograph in Kattermann's (1939) article on carolingian bindings from Reichenau documents its exposed spine which shows clearly that the sewing was not a '*karolingische Heftung*' (as he described for the others), but a link-stitch sewing with threads laced through the spine edge of the boards (section 7.2). Here, on the tiny island of Reichenau, link-stitch and herringbone sewing on supports were practised side by side; but, alas, the perhaps only reliable witness is lost for ever.

* * *

Even after the introduction of the sewing support, the board attachment and the mechanical properties of the joint region continued to be the binder's major concern, leading to countless variants of materials, structures and methods of attaching the support to the boards. It is on the basis of these aspects that in this book a typological distinction is made between three main categories of medieval wooden-board bindings: the carolingian, the romanesque and the gothic (Chapters 7, 8 and 9).[6] It should be stressed that these designations are devoid of any historical or art-historical significance and merely describe binding types according to technical characteristics. It goes without saying that time and again bindings combine features of more than one category or do not agree with any chronology and elude simple pigeon-holing: a binding with 'carolingian attachment' but otherwise a 'romanesque' features, or an incunable with 'romanesque' board attachment, are not very exceptional and should not be brushed aside.

Finally, Chapter 10 is devoted to the *libri sine asseribus*, the simple medieval limp bindings whose study has been much neglected due to their seemingly simple construction and lack of decoration. Closer examination has indeed revealed a wide variety of technical constructions; some of them may even go back to the first Coptic single-quire codices, others feature link-stitch sewing which survived in the Western bookbinding tradition beyond the late medieval times. Last but not least, these unpretentious bindings deserve attention for certain features that were later utilized in modern mass-produced binding structures.

NOTES

1. The term 'sewing support' seems rather inappropriate since it emphasizes an assumed function of supporting the sewing but neglects its essential function of attaching the bookblock to the boards; still, it will be retained as a broad generic term as it is so generally used. It seems appropriate to distinguish 'supported' and 'unsupported sewing', even though it 'puts the cart before the horse as regards the chronological evolution' (Petherbridge 1991 p. 404).
2. Roger Powell and Peter Waters studied the binding of the Stonyhurst Gospel on five occasions between November 1950 and February 1952 (Powell 1956 p. 362); this illustrates the great difficulty in understanding and describing binding structures. Through the courtesy of Dr Janet M. Backhouse I had the privilege of examining this binding in September 1988 and February 1991.
3. I owe thanks to Mr Ludwig Ritterpusch who kindly lent me slides and provided me with other valuable information on the restoration work.
4. Various terms have been used to designate decoration techniques involving cutting the upper layer of leather. The terms '*Lederschnitt*' and '*cuir-ciselé*' (the latter adopted in English by Goldschmidt 1928 pp. 75–82) describe most suitably the technique by which the background comprises small dots or any other regular pattern (Szirmai 1983). The term 'cut leather' is used for the decoration technique of cut lines without a background pattern, whereas the term '*Lederzeichnung*' denotes free-hand decoration drawn with a blunt tool on dampened leather; lines drawn with a creaser along a straight edge are referred to as blind lines.
5. Dr Vanessa C. Marshall (1993 p. 41) examined this binding recently and kindly informed me that the binding shows evidence of repair, which obscures details of the sewing and the original method of board attachment.
6. The terms 'Anglo-Saxon' and (less often) 'Norman' are employed in England to distinguish bindings dating from before or after the 1066 Conquest; they are assumed to correspond to the carolingian and romanesque types.

Chapter 7 Carolingian bindings

7.1 EARLY LITERATURE AND RECENT STUDIES

If Carl Scherer, librarian of Fulda Landesbibliothek around 1900, had looked more carefully at the Victor codex (Fulda Bonif. 1), the carolingian binding structure could have been elucidated half a century earlier. But as the interest of scholars in those days was restricted to the decoration, only this aspect received attention, especially the 'zigzag ornament' along the spine which then started its own enigmatic life (Scherer 1905 p. 11).[1] Loubier (1926 p. 83, fig. 57) and Theele (1929) reiterated these details, and G.D. Hobson (1939 pp. 216ff.) even claimed to have found analogies with the zigzag ornament on Coptic codices. The delusion ended with a brief note by Endres (1942), who looked at the binding structure and explained that the zigzag lines on the covering resulted in fact from indented marks of the V-shaped grooves that were part of the board attachment (see section 7.3, Figures 7.6 and 7.8[d]).

Having missed the chance to recognize the elements of the carolingian binding structure of the Victor codex in the early days, we had to wait for studies on larger groups of medieval bindings. An important article by Christ (1937) drew attention to simple medieval library bindings, some plain, others decorated with blind-tooled stamps and carrying a title on the back; they originate from monastic libraries in Germany and Switzerland (Fulda, Freising, Reichenau and St Gall) and were dated to the ninth or tenth centuries by palaeographical features of the back titles or by art-historical characteristics of the decoration.

As a direct result of Christ's article a number of studies of carolingian bindings was undertaken. The main principles of their binding structure were clarified by Heinz (1938) and Kattermann (1939) on the basis of around 20 original bindings from the Abbey of Reichenau.[2] Van Regemorter (1948) reported on nine French bindings; Unterkircher (1954) described seven bindings from Salzburg. Vezin published a series of decorated carolingian bindings in French collections: 18 bindings in Paris BNF (1970) and in Angers BM (1974); he also studied a variant of the board attachment of 10 bindings from Freising (1985) and of two similar ones from Würzburg (1988b). Barbier (1982) recorded six carolingian bindings in Valenciennes. Gilissen (1983) gave a detailed description of two carolingian bindings in Brussels, Federici and Pascalicchio (1993) documented six carolingian bindings from Italy. Although hardly any binding has survived intact from pre-Conquest England, observations by Pollard (1975) on reused boards, re-examined by Clarkson (1996a), and a meticulous study by Gullick (forthcoming) all testify that the same binding structure must have been employed there as well.[3]

Table 7.1 Palaeographical dating of 130 carolingian bindings (the 'Germanic group') from St Gall StfB (110), Vienna ÖNB (9, mostly from Salzburg), Karlsruhe BLB (6, mostly from Reichenau) and Munich BSB (5 from Freising).

		Number	*Per cent*	*Total*	*Per cent*
Early group:	s. viii–ix^{in}	32	24.6	89	68.5
	s. ix	57	43.9		
Late group:	s. ix^{ex}	19	14.6	41	31.5
	s. x–xii	22	16.9		
	Total	130	100	130	100

The above studies concern slightly more than one hundred bindings, around 40 of which I have re-examined in recent years; a further 130 carolingian bindings came to light during my survey of medieval bindings of St Gall Stiftsbibliothek between 1989 and 1992.[4] Although more than 200 codices seem to provide sufficient data to establish the typology of a binding structure, they constitute only an infinitesimal fraction of the books produced in monastic scriptoria of the Western medieval world. St Gall StfB is unique in having miraculously managed to keep the main part of its original holdings, and the survival rate of some 25 per cent of the carolingian bindings is exceptionally high.

The following description of the carolingian binding structure is mainly based on the study of approximately 150 bindings (see note 4), of which around 130 are considered to be original (Table 7.1). This sample is far from representative because of the prevalence of bindings from the 'Germanic' area in general and from St Gall in particular. The material ranges from the late eighth to the end of the twelfth centuries as classified in the catalogues on the basis of palaeographical criteria; a division into an 'early' and a 'late' group was found useful to test the chronology of certain characteristics.

7.2 INTRODUCTION OF THE SEWING SUPPORT

Carolingian bindings are the earliest examples of the universal use of the sewing support, characteristic of the Western binding tradition. From the very beginning the sewing support occurs in combination with herringbone sewing. The similarity of the latter to the link-stitch sewing is more than superficial: the thread movement of the herringbone sewing is in fact a link-stitch sewing worked around two reinforcing cords that serve as sewing supports (Figure 7.1); terms like 'herringbone link stitch' (Cains 1985 p. 31) acknowledge this relationship. Bozzacchi (1980; 1985) advanced the idea that the sewing support evolved from

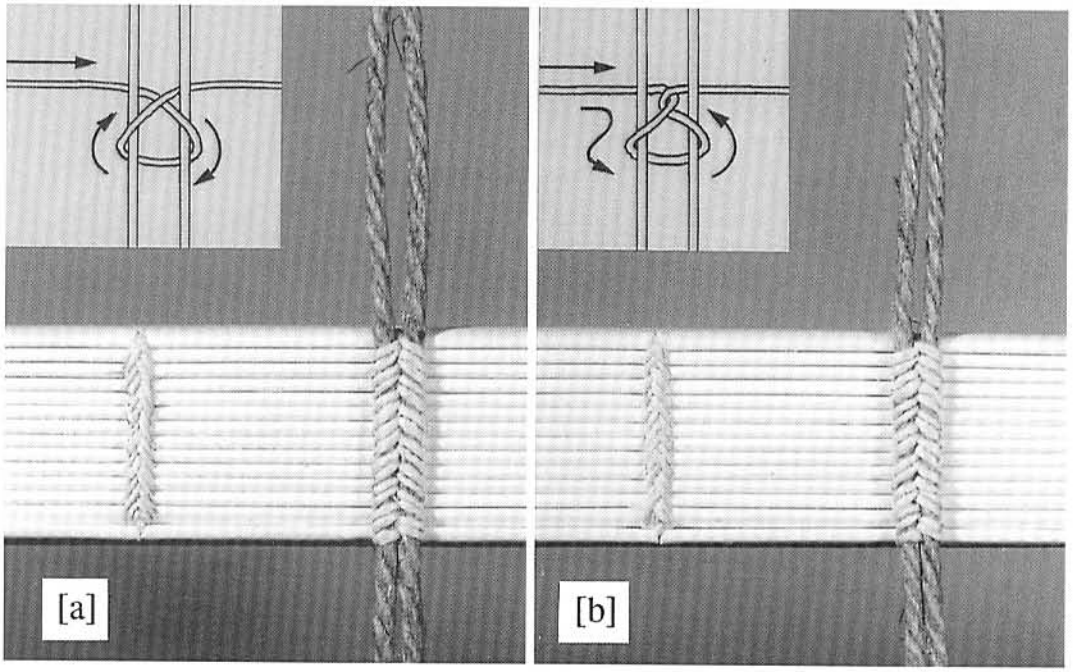

Figure 7.1 Possible origin of the sewing support as a reinforcement of the link-stitch sewing shown on models: [a], (left) link-stitch sewing and (right) supported herringbone sewing, with thread movement of α configuration (inset); [b], as in [a], but thread movement according to configuration β (inset; cf. Figure 2.1[a] and [b]). All four sewings show two-step linking.

the unsupported link-stitch sewing, referring to the Evangeliary of St Maria in Via Lata (Vat. Cod. I 45); he thought that the gatherings 'were chain-stitched as in Greek, Byzantine and Islamic codices, but with the hemp bands inside' (Bozzacchi 1985 p. 249). Yet this example is dated as no earlier than the eleventh century, whereas the first supported herringbone sewing goes back to the first carolingian bindings of the eighth century.

It is very unfortunate that virtually all early evidence has been lost. This especially pertains to around 20 carolingian bindings from the Abbey of Reichenau (kept at Karlsruhe BLB), which escaped rebinding in 1457 but were finally destroyed by 'restoration' in the 1970s (see note 2). As mentioned above (see Introduction, Part II), the photograph of the damaged spine of one of these bindings (BLB Reich. 233), leaves no doubt that it had a link-stitch sewing and that the sewing thread itself was anchored through tiny holes into the boards (Figure 7.2).[5] Evidently mistaken by Kattermann (1939) for herringbone sewing, it testifies that link-stitch sewing and herringbone sewing were both practised at the Abbey of Reichenau, which could have been one of the pioneer sites of the new technique. The loss of this possible testimony is painful, and we must accept that so far we neither have any physical evidence of the first appearance of the sewing support, nor any contemporary literary or iconographical witnesses.[6]

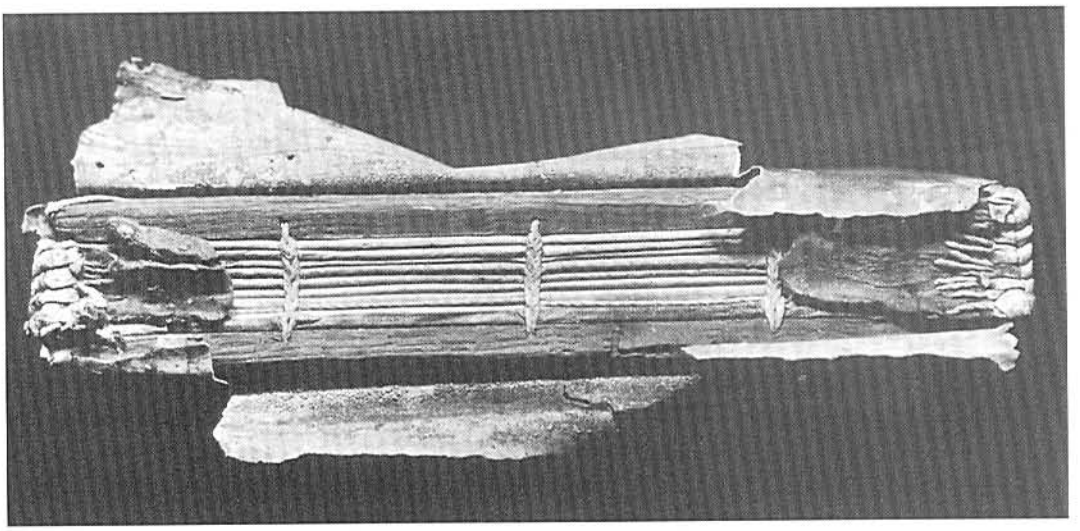

Figure 7.2 The spine of a ninth-century binding from the Abbey of Reichenau (BLB Reich. 233, Commentarius in epistolas canonicas, *c.* 227 × 150 × 37 mm). The seven quires are sewn with link-stitch sewing, with a Z-twist thread, *c.* 1.2 mm in diameter; the binding was probably repaired during the refurbishing operation of 1457 and then received a secondary leather endband (from Kattermann 1939 fig. 34).

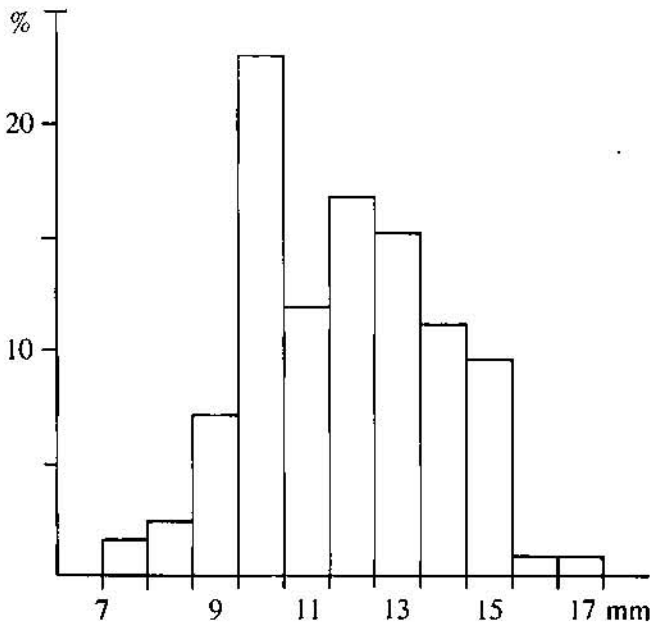

Figure 7.3 Histogram of board thickness of 126 carolingian bindings. Mean = 11.8 mm, *s.d.* = 2.05.

7.3 BOARDS AND BOARD ATTACHMENT

Preparing the wooden boards, literally the basis of the carolingian binding, would be the binder's first task. The predominant wood was oak, constituting 82 per cent of the boards in the 130 bindings studied (the remaining percentages are: beech 3.5, fruit tree, poplar and plane 6.0, unidentified 8.5). The figures from the literature concerning French and Italian as well as English bindings are similar: out of 49 records, *c.* 78 per cent is oak (beech 4, plane and poplar 10, unidentified 8 per cent).

The thickness of the wooden boards including the leather covering ranges from 7 to 17 mm. However, the histogram showing the measurements from 126 bindings (Figure 7.3) seems to yield more than one peak, suggesting that the sample is, in statistical terms, not homogeneous. This may be due to an error introduced by the differences in thickness of the covering leather, which ranges from about 0.7 to 2.0 mm, or to the different methods of preparing the boards by either cleaving or sawing. Marks of sawing or cleavage could be observed in a few cases (Figure 7.4); otherwise the surface is smooth, only occasionally the marks of an adze being noted. These observations are not representative, since most of the bindings have both the outer and inner faces of their board covered and thus are inaccessible. The board edges could be inspected in only 49 out of the 110 St Gall bindings; in 45 cases the cross-section shows a perpendicular arrangement of the annular rings, indicating that the boards were sawed or cleaved on the quarter – a sound medieval method which prevents warping but facilitates accidental splitting. The edges are cut square and are often slightly bevelled; rounding is exceptional (Figure 7.5). The prevalence of square edges is also reported by Vezin (1970).

The next step in preparing the boards was making tunnels and channels to attach the sewing supports. The most common carolingian attachment, designated here as Type I, was first described by Heinz (1938) and Kattermann (1939) for Reichenau bindings and later by van Regemorter (1948) for a few French bindings (her type A).[7] The lacing path (Figure 7.6) consists of a tunnel made from the spine edge obliquely towards the outer face of the board, exiting at about 10 mm from the spine edge [1]; from this exit, two channels are cut in V-shape on the outer face, each terminating in a hole [2]. On the inner face of the board these two holes are interconnected by a channel [3]. The sewing support is made by threading either end of a cord through the holes from the inner face of the upper board, so that the middle portion sinks into the channel [4]. The two ends continue in the V-shaped channel [5] and jointly travel through the oblique tunnel, exiting at the spine edge as the double sewing support [6]. After the last quire is sewn, the lower board is attached correspondingly by passing the two ends of the cord jointly through the oblique tunnel onto the outer face of the board, then over and in the V-shaped channels and back through the two perpendicular holes. On the inner face and inside the channel the two ends are tightly twisted [7], sometimes additionally secured with wooden wedges or dowels [8]; in [9] the lacing path is shown in cross-section. Kattermann (1939) noticed that a lasting impression of the twisted cords and their pegging could be observed on the last parchment leaves of carolingian codices.

Attachment Type I is characteristic for the carolingian bindings from Reichenau, St

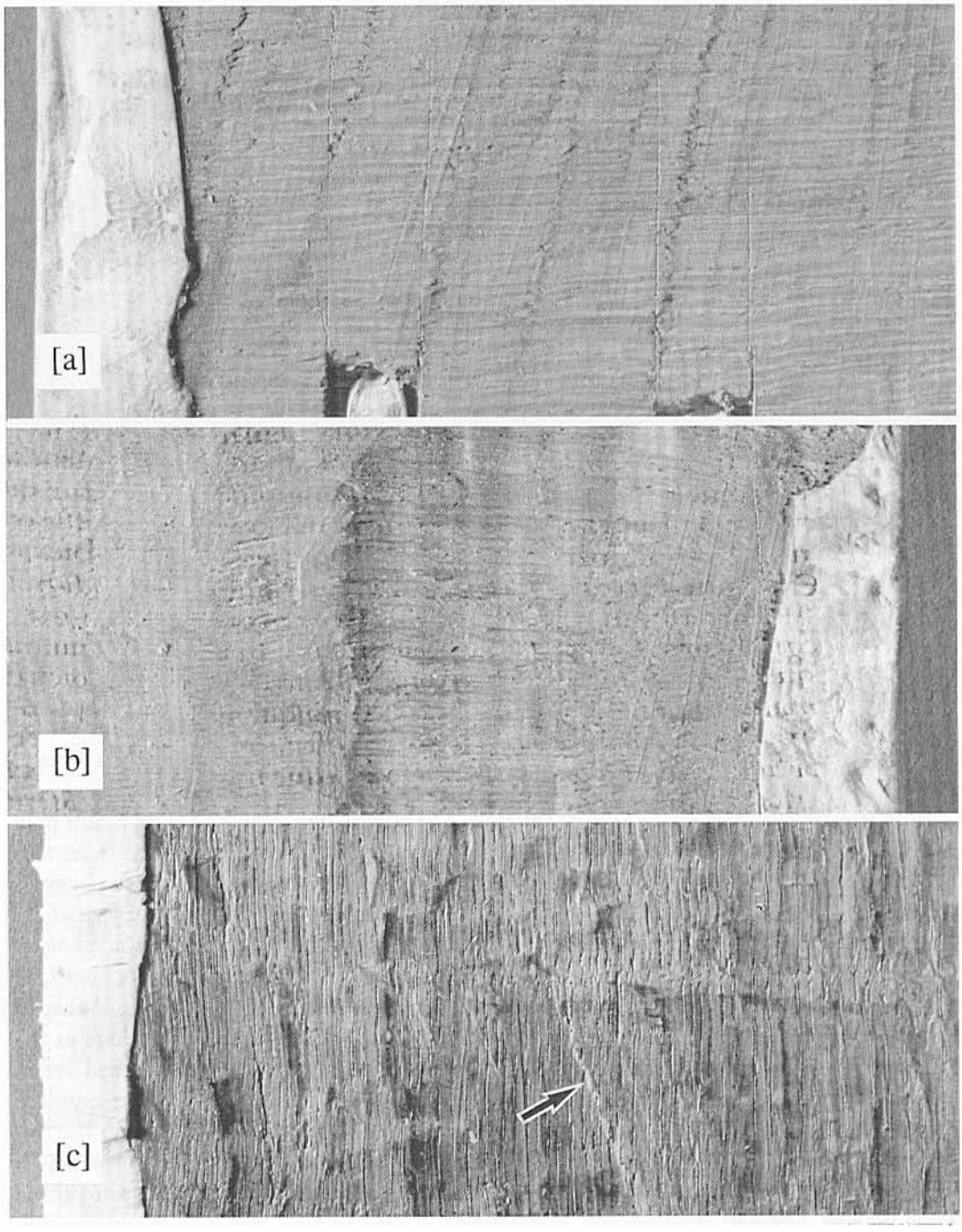

Figure 7.4 Score marks on the inner face of the board: [a], streaks resulting from sawing (SG Cod. 155, s. x); [b], concavity caused by cleaving; note also marks of mechanical grip in the turn-ins, shown also in Figure 9.35 (SG Cod. 172, s. x); [c], marks of the smoothing adze (arrow; SG Cod. 184, s. x–xi).

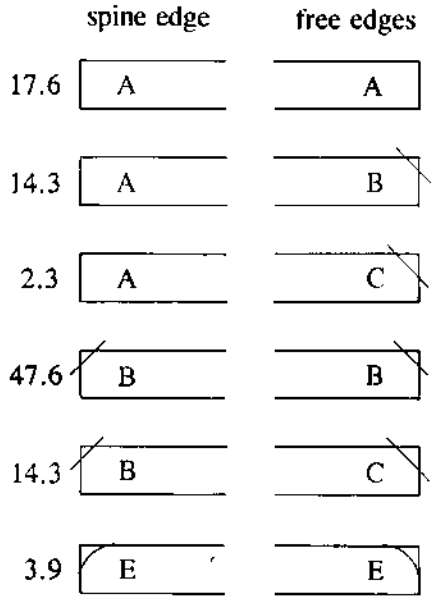

Figure 7.5 Profiles of board edge as seen in cross-section on 128 carolingian bindings: (left) spine edge, (right) free edges. A, square; B, bevelled less than one-third of the thickness; C, bevelled about half the thickness; E, rounded. The numbers represent percentages (modified from Szirmai 1995).

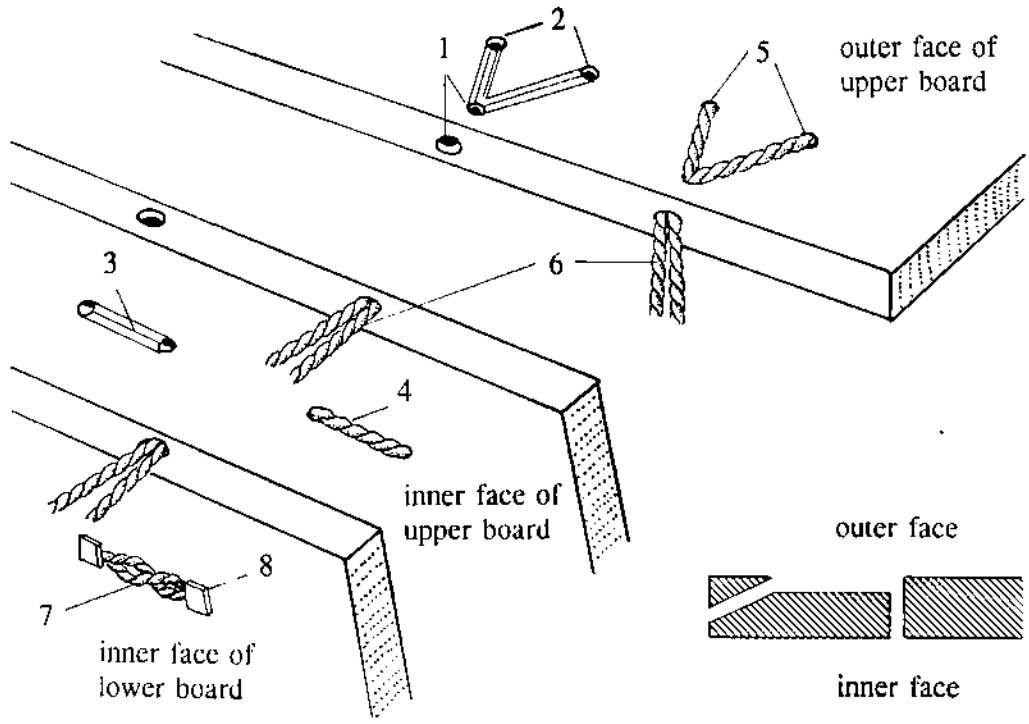

Figure 7.6 Carolingian board attachment of Type I (for details see text; from Szirmai 1995).

Gall and Salzburg, but probably also from many other workshops. In terms of figures out of 130 bindings studied 122 (94 per cent) belong to this type. It is also the prevailing type on bindings of French origin, such as those from Corbie (Vezin 1970), Angers (Vezin 1974) and St Amand (Barbier 1982), and of the Mondsee Gospel Lectionary (Baltimore WAG MS 8, s. xi–xii) described and illustrated by Clarkson (1978a; 1978b, fig. 1). The bindings of Anglo-Saxon origin as certified by those few examples we know of (Pollard 1975; Clarkson 1996a, Gullick, forthcoming), seem to belong to the same category.

The geometry of the lacing path assumes many variants (Figure 7.7[a] to [e]). The angle of the bifurcation of the V-shaped channels ranges from *c.* 30 to over 110 degrees, and their lengths, which are not necessarily even, vary between 20 and 80 mm. The short channel on the inner face of the board runs parallel to the spine edge or can form an angle of up to 45 degrees. These variations could reflect local differences in workshop practice: the geometry shown in Figure 7.7[a] is characteristic of St Gall bindings and is easily distinguishable from bindings of any other origin. The few Anglo-Saxon examples (Pollard 1975; Gullick, forthcoming) have configuration [b] or [c]. There are also characteristic variations in the disposition of the lacing paths along the spine. The channels in the inner face of boards can be situated at a uniform distance from the spine edge and can show an identical configuration, but more often one of the three or four attachments has a reversed slant of the base angle ß (Figure 7.8[a]). In order to reduce the risk of splitting the boards, the

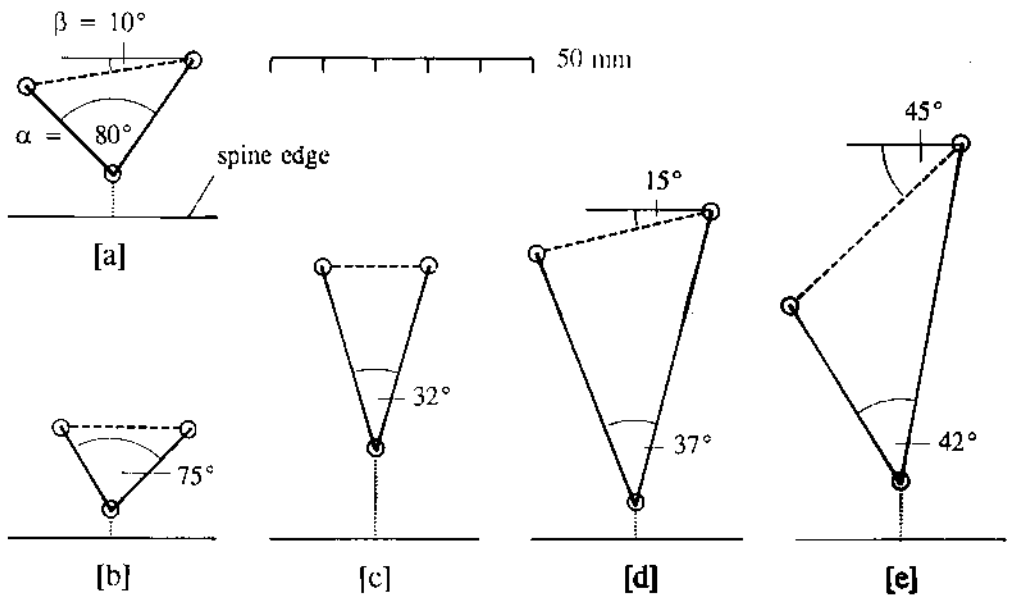

Figure 7.7 Variants in the geometry of the lacing path of attachment Type I, as seen on the outer face of the board: [a] (the St Gall pattern) has a rather wide angle of the V-shaped channels (α), ranging from 70 to 110°, and a slight angle of deviation (ß) from the spine edge; in [b] (SG Cod. 272, s. ix, origin unknown) and [c] (Bodley Bodl. 319, from Exeter, s. ix^{ex}) the angle ß is zero; [d] (SG Cod. 177, s. ix, from Auxerre) and [e] (ÖNB Cod. 1003, s. ix^{1}, from Salzburg), show increasing values of angle ß.

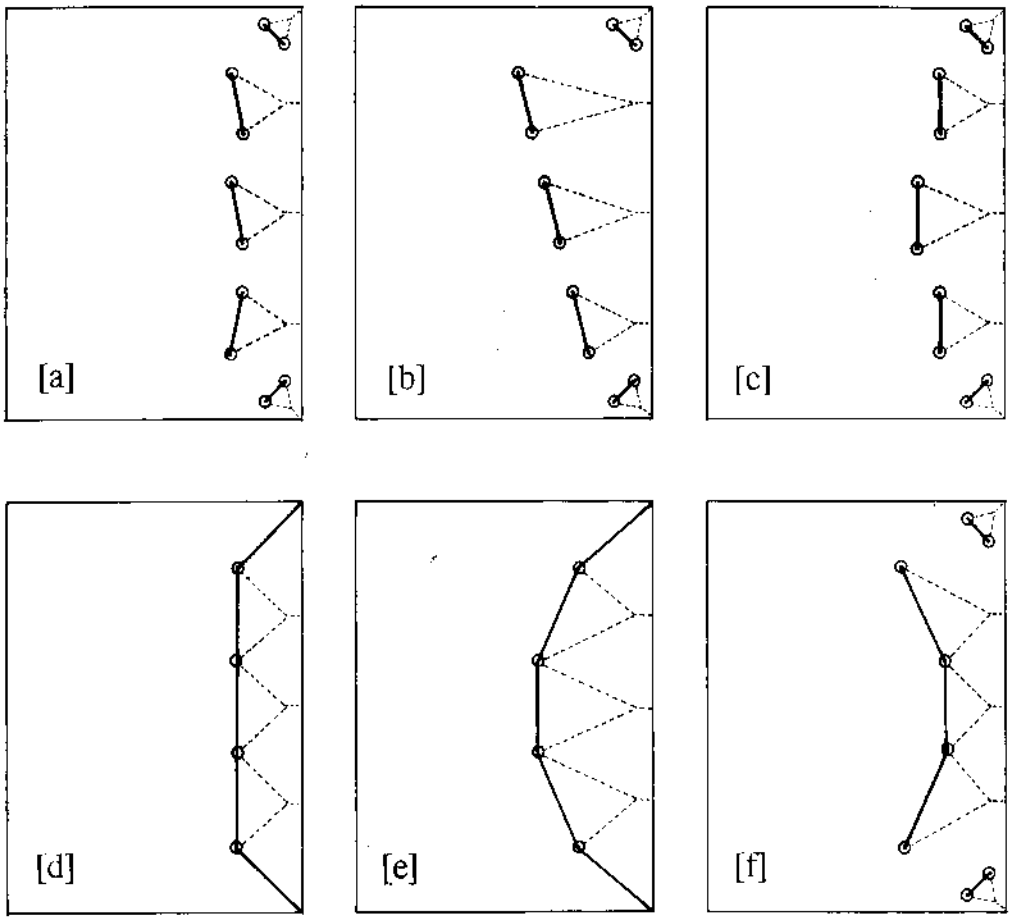

Figure 7.8 Variants in the disposition of the lacing paths of attachment Type I, as seen on the inner face of the board: [a] is typical for bindings from St Gall and Reichenau; [b] represents ÖNB Cod. 1003 and several Salzburg bindings; [c], SG Cod. 272 (s. ix, origin unknown) has staggered parallel patterns. Interconnected lacing paths have [d], (Leiden UB BPL 114, s. ix, reused boards; Angers BM MS 191, s. ix^{in}), [e] (Victor Codex, Fulda HLB Cod. Bonifat. 1; SG Cod. 457, s. ix, from Fulda) and [f] (Angers BM MS 170, s. x^{in}).

channels were often arranged in an oblique line [b], or along two different lines running parallel to the spine edge [c]. A reduction of the number of holes was achieved by using joint holes for adjacent 'V's; these holes may be arranged in a straight line, see [d], or – more effectively – in a convex [e] or concave line [f]. The attachment of the endband supports (see below) can be independent of those of the main supports [a] to [c] and [f], or be integrated with the channel system, see [d] and [e]. There are more variants: the headmost and tailmost attachment holes can also be used for anchoring the endband supports as in [d], but otherwise the disposition remains as in [a]. This combination of [a] and [d] occurs on SG Cod. 224; similar examples are described in Kyriss (1936 p. 30), Endres (1942) and Steenbock (1965 no. 62).

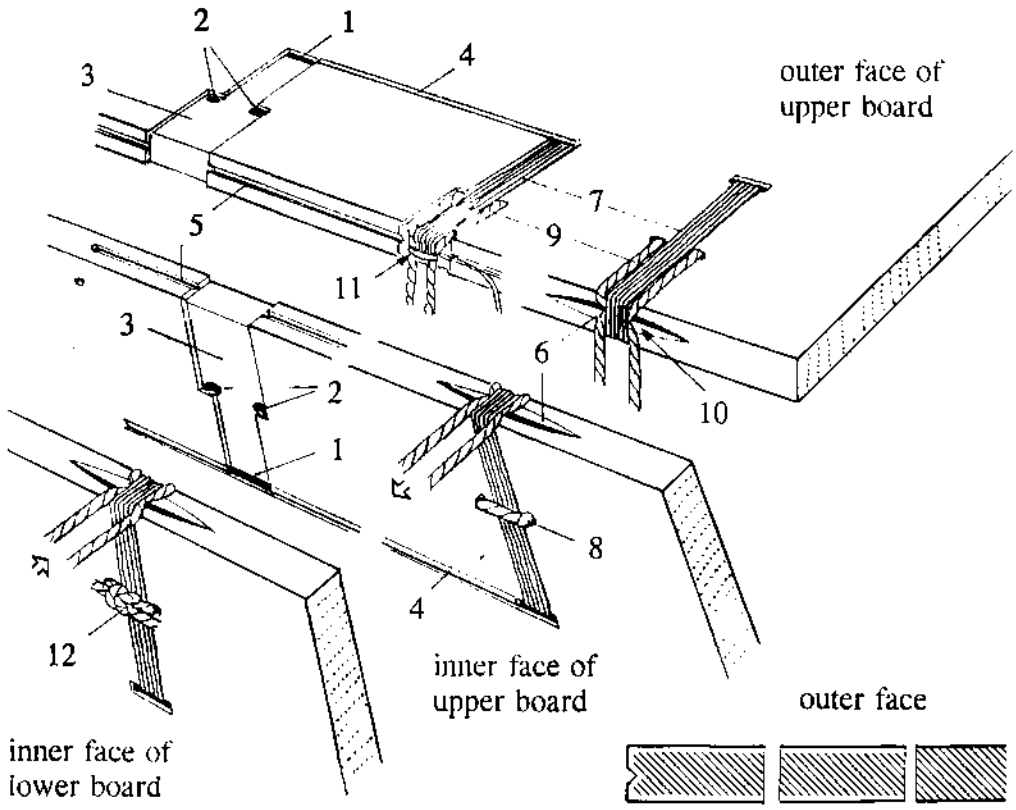

Figure 7.9 Carolingian board attachment Type II (for details see text).

A different type of board attachment, designated here as Type II, has been found on a smaller number of carolingian bindings. Endres (1936) noticed it first on Würzburg UB Mp.th.f. 146, soon supplemented by Kattermann (1939) with further details on two bindings from Fulda (Kassel GHB MS Theol. 31 2° and Theol. 44 2°).[8] A similar structure was described by van Regemorter (1948) on Autun BM MS 19 (18s). A dozen bindings were reported by Vezin (1985; 1988b), ten originating from Freising, two from Würzburg (including Mp.th.f. 146). The same type of attachment occurs on a treasure binding from Vercelli (Steenbock 1965 no. 28), and on two bindings from northern Italy (Federici and Pascalicchio 1993); a somewhat similar structure has been noted by Bozzacchi on two Italian bindings (in Supino Martini 1980; Bozzacchi 1985). To this list I can add ÖNB Cod. 484 and probably SG Cod. 146, both of unknown origin.[9]

The construction of attachment Type II (Figure 7.9) was described in detail by Vezin (1985; 1988b). The first step in preparing the lacing path consists of making slits [1], a pair of holes [2] and, as a rule, a shallow recess [3] in the boards, corresponding to each sewing station; the slits are interconnected with shallow grooves [4]. The spine edge can have a groove all along [5] or individual grooves at each station [6]. Next, a piece of thread,

identical to the sewing thread, is wound several times around the spine edge and through the slit as a continuous operation for each support [7], the thread travelling from one slit to the next in the shallow grooves. Finally, a length of cord is anchored by passing the two ends through the holes from the inner face [8]; the two ends proceed on the outer face alongside the wound threads towards the spine edge [9], where they are either taken underneath the wound threads, crossing each other [10], or are held together by knotting with a separate piece of thread which runs along the spine edge [11]. After the sewing is finished, the attachment of the lower board is carried out correspondingly, though obviously in reverse; the two ends of the sewing support are twined or knotted on the inner face of the board [12]. As with attachment of Type I, the disposition may vary and the holes and slits through the board may be distributed along an oblique or curved line (Figure 7.10).

Attachment Type II is astonishing in its complexity and requires skilful and time-consuming work. It is reminiscent of the hinging loops on Coptic and byzantine bindings (see section 6.4, Figure 6.6); indeed Vezin (1985) compares them with the byzantine attachment, and Federici and Pascalicchio (1993) designate this attachment 'pre-carolingian as it shows also a Byzantine influence'. However, in byzantine bindings the loops serve as direct means of board attachment, whereas in the carolingian Type II they have no other function than to hold together the two parts of the sewing support close to the board edge. In byzantine bindings the thread of the hinging loops was often continuous with that of the sewing; in Type II no such connection is evident. It is tempting to conjecture that we are

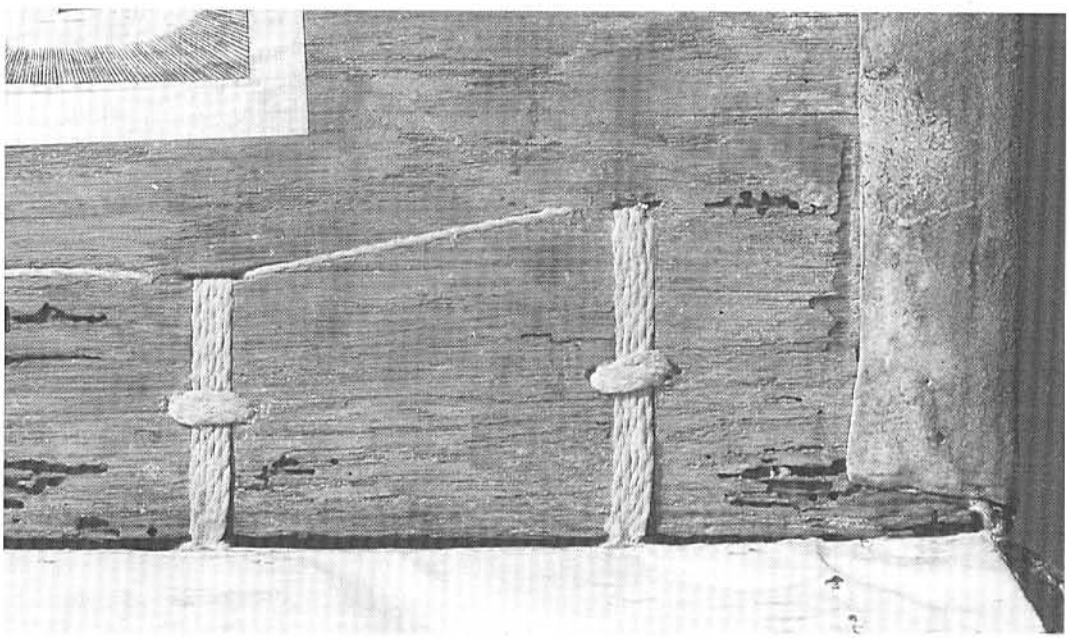

Figure 7.10 Detail of board attachment Type II: inner face of the upper cover of BSB Clm 6273 (s. ix^{1}, Freising). Note the slightly oblique course of the thread between the first and second slit.

dealing with an attempt to maintain the traditional byzantine hinging system and to integrate it with the innovation of the sewing support; the oblique anchorage channels, typical of the byzantine endband like that on Vat. Cod. I 45 (Bozzacchi 1996) would indicate such an evolutionary step. Yet, in view of the relatively small number of carolingian bindings with attachment Type II known so far, the significance of this binding structure remains an open question.

Another carolingian attachment is even less frequent and is tentatively described here as Type III; it is considered significant because it is closely related, if not identical, to the Armenian attachment (see section 6.12). I encountered it in two instances only, but the intact condition of the bindings prevented me from observing its structure in detail: SG Cod. 97 (Psalterium, s. x, possibly of Italian origin) and Würzburg UB Mp.th.f. 71 (Augustini Confessiones, s. xi), probably from the Amerbach Benedictine monastery (eastern Franconia). The sewing supports are of double cord, possibly sunk into shallow channels, and traverse the board in a single hole some 30 to 70 mm from the spine edge; since the inner face of the boards of both bindings is completely covered with the pastedown, the double cord was only to be observed in raking light and, even more clearly, on rubbings. Figure 7.11 shows the most probable though conjectural reconstruction, based mainly on SG Cod. 97. Two further bindings display certain similarities with this type of attachment: Autun BM MS 5 (4s), (Evangeliary, s. ix), described by van Regemorter (1948 pp. 280–5, pl. 20b and 21a) as having sewing supports of twisted leather and attached with perpendicular loops using three transverse holes, and Bodley Hatton 23 (Pollard 1975; Clarkson 1996a; Cassianus, s. xi, written in Worcester), where X-rays have revealed a somewhat similar course of double (leather?) supports, but traversing (or secured?) through two holes only, unfortunately not accessible for direct examination.

As mentioned above, attachment Type III is virtually identical to the attachment of the sewing supports on Armenian bindings (see section 6.12; Figure 6.20). Both the Western and the Armenian variants have in common the slightly different attachment of the upper and lower board: one begins with anchoring the sewing support with a loop in one board and finishes by knotting the two ends in the other board.

The differences in anchoring the sewing supports in the upper and lower board are such a consistent trait of carolingian bindings, that the occurrence of loose ends and their pegging in both boards is likely to indicate rebinding, namely sewing the bookblock first and then attaching the boards by reusing the original holes. This is undoubtedly the case with SG Cod. 260 (Beda, s.x., written and bound by Halpertus in St Gall); resewn in medieval times, as is evident from many technical details, it shows pegging of the cord sewing supports in both upper and lower board. Several other instances of such attachment may be listed, for example Autun BM MS 39 (42s) (Solinus, s. xi) described by van Regemorter (1948), who presented this binding as evidence for the use of the sewing frame. Vezin (1970) on BNF MS lat. 12294 had no doubts that such an attachment was the result of rebinding. The binding of an English manuscript, Copenhagen KB GKS 1595 (Morrish Tunberg 1993, pp. 50–8), sewn on double thongs with slips plugged in either board, is probably a rebinding, too.

However, despite these considerations one cannot exclude the fact that an

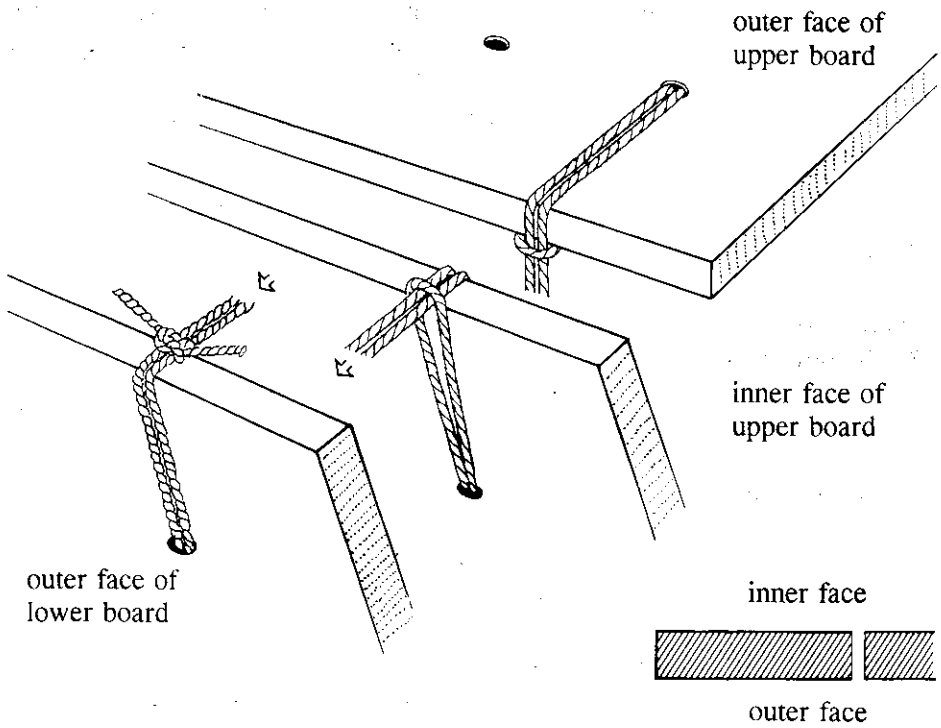

Figure 7.11 Carolingian board attachment Type III, based on SG Cod. 97; (below right), cross-section of the board edge.

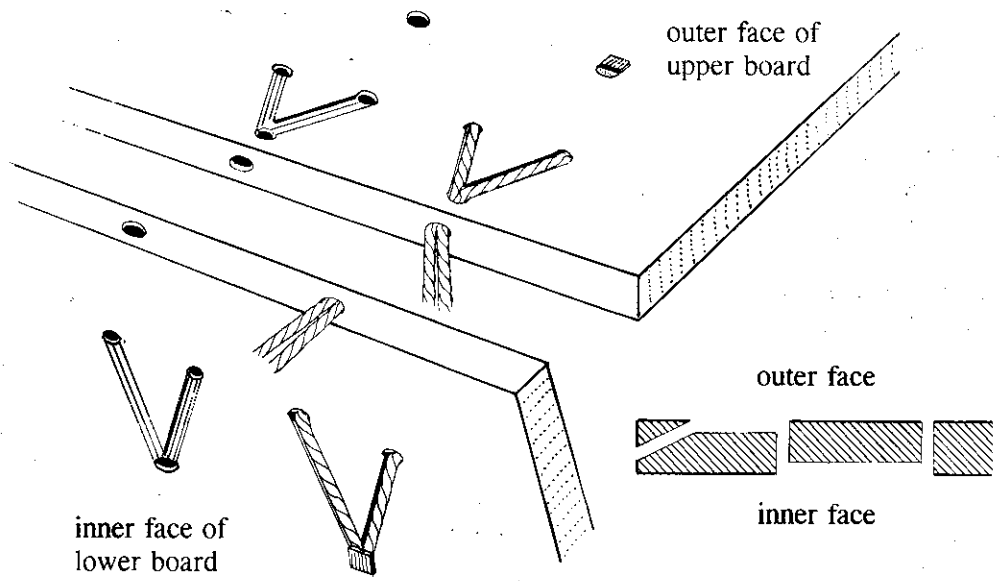

Figure 7.12 Carolingian board attachment Type IV, based on Vienna Erzbischöfliches Museum Inv. no. 13; (below right), cross-section of the board edge.

authentic (late) carolingian attachment with pegging of the sewing supports in both boards did exist, and thus should at least tentatively be designated as Type IV. The few examples show in part the geometry of the lacing path of Type I, with the double sewing support entering into the spine edge of the board and continuing separately in V-shaped channels on the outer face (Figure 7.12). As usual, the two ends traverse the board through two holes onto the inner face, but proceed and converge in a 'reversed' V-channel in one hole where they are jointly pegged. This lacing path was observed by Pollard (1975; see also Clarkson 1996a and Gullick, forthcoming) on Bodley Bodl. MS 311 (Penitentiale, s. x., probably Continental) by means of X-rays; the supports are of double cords and the sewing is possibly original, although the covering has been renewed. I have seen this attachment of double cords on Vienna Erzbischöfliches Museum Inv. No. 13, a late ninth-century Evangeliary very likely in its second binding of unknown date.[10] Vezin (1974) reported a binding (Angers BM MS 67, written in St Aubin, s. xi) with this type of attachment (with sewing supports of leather thongs) on its lower board only; its upper board has a Type I attachment as shown in Figure 7.8[f].

7.4 SEWING

The sewing supports of carolingian bindings are predominantly of vegetable origin: out of 130 cases studied, less than 10 per cent had sewing supports of white leather thongs. The latter seems to occur more frequently on carolingian bindings from France and Italy, but limited data preclude any conclusion.

The number and position of sewing supports were recorded in 122 bindings. The major part (70 bindings) are sewn on three sewing supports, 46 on four and three bindings each are sewn on two and five sewing supports. There is no clear correlation with the spine height, which ranges from *c.* 200 to 370 mm (mean = 276.9; *s.d.* = 50.3). An even spacing between the sewing stations seems to be the rule, except for the outermost spine segments which assume deviations of certain regular patterns (Figure 7.13). These outermost spine segments are considerably shorter (by about 30 per cent) than the intermediate segments in groups [a] and [b], shorter by a small fraction only (6 to 7 per cent) in bindings of group [c] and [d]; in group [e], the outermost spine segments are slightly longer, (*c.* 6 per cent). The small differences in groups [c] to [e] (*c.* 4 mm on average) may be due to an inaccuracy in matching the dimensions of boards and bookblock; these few millimetres are of the same order of magnitude as what would be cut off when using a drawknife for trimming the edge (see below). Finally, a few bindings were observed with the outermost spine segments being markedly larger than the intermediate ones, namely by some 25 per cent (Figure 7.13[f] and [g]); although this is seen in only a few examples, these may represent another workshop practice. The few bindings with two sewing supports only, omitted from Figure 7.13, conform to the bindings of group [a], while bindings with five supports conform to those of group [c].

All sewing stations are provided with holes for passing the sewing thread, mostly prepared in advance. Out of the 121 cases where this feature could be determined, 74 per

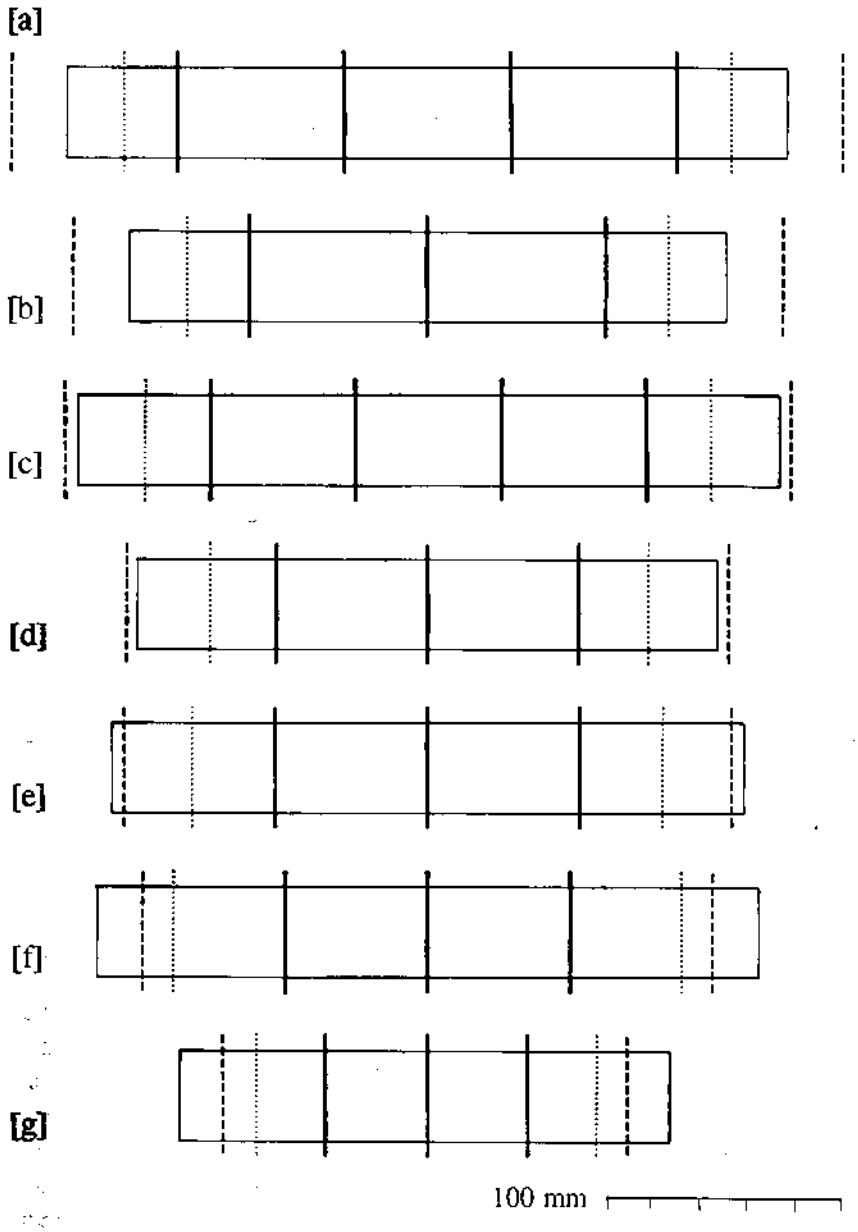

Figure 7.13 Main patterns of the disposition of sewing stations on 112 carolingian bindings. The continuous vertical lines show the main sewing stations, the broken lines represent the next theoretical equidistant spacing; the dotted lines indicate the change-over stations. The numerals give the number of bindings in each group: [a] 8, [b] 20, [c] 35, [d] 36, all from St Gall; [e] nine from Salzburg and Reichenau; single cases are [f] (BLB Reich. 74, from St Denis) and [g] (SG Cod. 296, probably from Fulda).

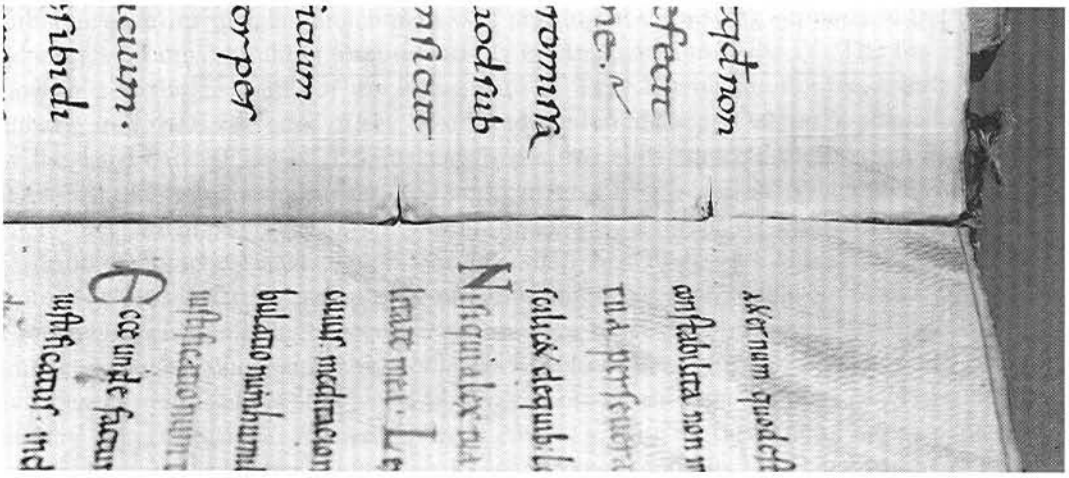

Figure 7.14 Sewing holes (slits) cut with a knife or chisel (SG Cod. 184, s. x/xi, pp. 50–1; from Szirmai 1995).

cent have single slits, cut 3 to 6 mm deep into the spine folds (Figure 7.14); in the remainder of the cases, the sewing holes are pierced. Slit holes are characteristic for the St Gall codices, whereas, as a rule, pierced holes occur in those of foreign (often French) origin. The same probably applies to the Reichenau bindings: about 10 which I examined have slits, but BLB Reich. 74, originating from St Denis, has pierced sewing holes. The few bindings from Salzburg and Freising that I studied and that are still in their original state, revealed pierced holes, which were also observed by Vezin (1985) on the Freising bindings; two bindings from northern Italy are reported to have slits, three others have their holes pierced (Federici and Pascalicchio 1993).

In addition to sewing holes – and to the holes belonging to the endband sewing,

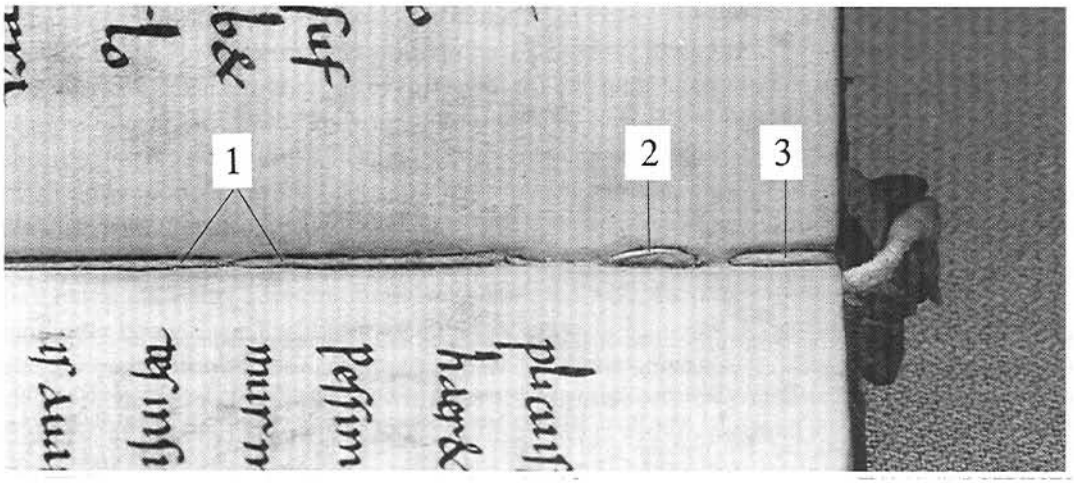

Figure 7.15 Centrefold of the third quire (pp. 42–3) of SG Cod. 195 (s. ix), showing: (1), the textblock sewing, (2), a parchment quire tacket and (3), the endband sewing (from Szirmai 1995).

discussed below – one may further encounter pierced holes in the centrefolds, usually close at the head and tail and spaced *c.* 5 to 10 mm apart. These served for quire tacketing, mostly with twisted strips of parchment (Figure 7.15). Often the binder did not take the trouble to remove them before sewing the bookblock, as seen in various late Coptic and byzantine bindings. In the group of the 130 carolingian bindings studied I found tacket holes or intact tackets in 16 instances: 14 in bindings of St Gall, one in a Reichenau binding (BLB Reich. 187, s.ix) and another in a manuscript from Fulda (Basle UB MS F.III.15e, s. ix). Whereas the twisted parchment tacket is the usual form, in a few cases I found instead a triangular piece of parchment, inserted into a single hole in the centrefold. The actual occurrence of tacket holes could be more frequent, since they are often hidden underneath the sewing thread and thus easily overlooked. In a few cases small single holes along the spine edge have been noted; these are possibly marks of stabbing or of 'marking up' the sewing stations for the holes to be pierced.

The sewing of the bookblock of carolingian bindings always begins with the first quire and around the sewing supports which are anchored in the upper board. It was described in detail by Heinz (1938), who noticed that the sewing thread enters the first quire at the outermost station at the tail, the end being knotted with the thread that had returned to the corresponding station of the second quire. Heinz described the herringbone sewing correctly, that is, the linking with the sewing of the preceding quire, but illustrated the link wrongly (p. 35, fig. 6). Of the 130 bindings studied, I could only observe the herringbone pattern directly in 54 cases. In several instances the scuffed leather covering revealed the herringbone pattern; often unequivocal evidence could be derived from rubbings made over the back. Straight sewing (see section 8.5, Figure 8.5[b] and [c]) is rather unusual and was found in only five of the 130 cases; four of these (SG Cod. 78, 211, 281 and BSB Clm 6210) are evidently medieval rebindings, one (SG Cod. 245) is possibly an original binding on an eleventh-century manuscript. Straight sewing on a carolingian binding should be considered with suspicion.

Examination of the thread movement at the change-over station in 112 bindings disclosed the frequent occurrence of simple spans instead of link stitches (Figure 7.16). Spans were found in 65 cases (58 per cent), link stitches in 47 (42 per cent). To test the chronology of this trait, the distribution over the 'early' and 'late' bindings (see Table 7.1) was compared. This revealed that the span occurs three times more often in the early group (eighth and ninth century); the chi-square test proved this to be a significant difference ($\chi = 9.4$). This outcome suggests that initially little mechanical importance was attributed to the connection of the quires at the change-over site. Span change-over was reported on two ninth-century bindings: Vezin (1988b) noticed it on Würzburg UB Mp.th.f. 146, Federici and Pascalicchio (1993) on Brescia, Biblioteca Queriniana MS G.VI.7. In contrast to the relatively weak span, one can encounter the much stronger alternative where the change-over is integrated into the sewing of an outermost double support, as it is regularly done on Armenian bindings (see section 6.12, Figure 6.20); an example is Modena, Archivio Capitolare MS O.IV.1 (s. xi/xii), described by Federici and Pascalicchio (1993).

The sewing thread was studied in some detail (for methods see Chapter 6, note 9).

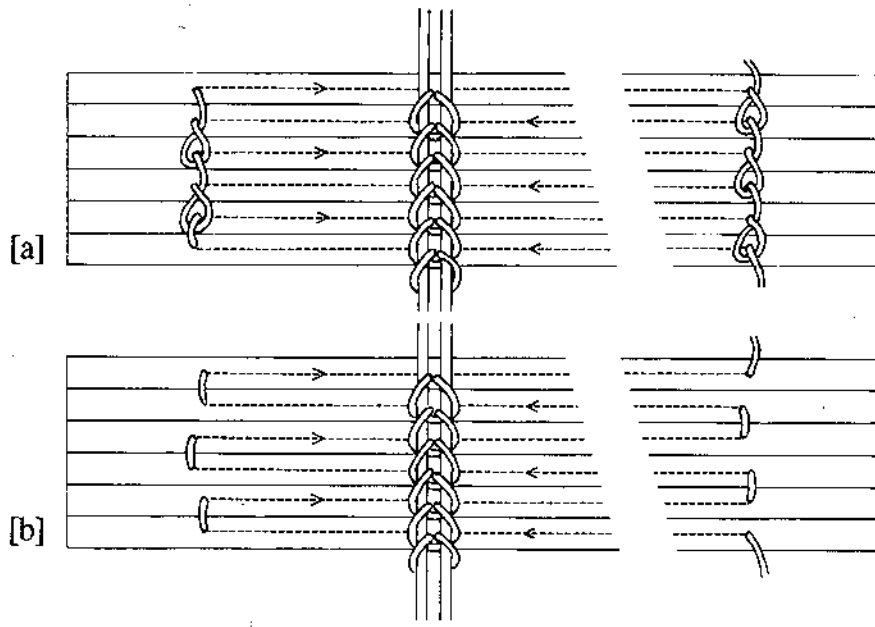

Figure 7.16 Two types of change-over: [a], climbing link stitch, joining the adjacent quires at both the head and tail; [b], span connecting two adjacent quires alternately at the head and tail. In [a] the holes are usually cut as for the main sewing stations, in [b] the change-over stations are usually pierced and often staggered in pairs.

The thread diameter, measured in 117 cases, gave a mean value of 0.78 mm ($s.d$ = 0.16); the histogram in Figure 7.17 shows a slightly skewed distribution. The final twist could be observed in 119 bindings, the make-up in slightly fewer cases (Table 7.2). Clearly the Z-twist predominates (73 per cent), but the significance of this becomes only evident when the make-up is considered: it then appears that the S-twist in most cases means a single-ply thread, whereas the Z-twist represents mostly re-plied threads. Single-ply threads with a final S-twist are usually composed of two, three or four z-spun yarns (2z-S, 3z-S, 4z-S; see for notation Chapter 6, note 9), but larger numbers of up to 20 yarns have

Table 7.2 Final twist and make-up of the sewing thread in 119 carolingian bindings (percentages given in brackets)

	S-twist	*Z-twist*	*Total*
Single-ply	25	8	33 (28)
Re-plied	2	67	69 (58)
Unknown	5	12	17 (14)
Total	32 (27)	87 (73)	119 (100.0)

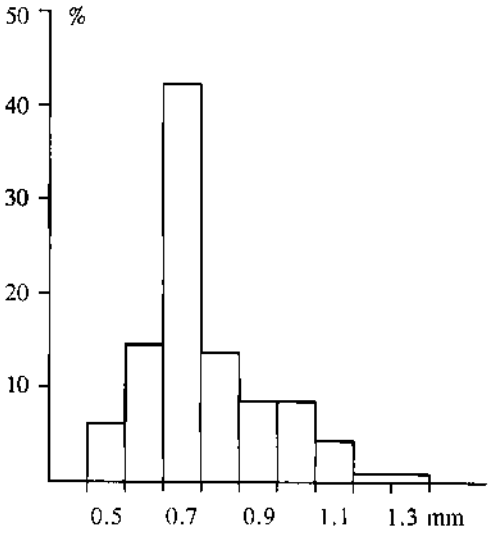

Figure 7.17 Histogram of the diameter of sewing threads of 117 carolingian bindings.

been noted; the most frequent types of re-plied threads with a final Z-twist comprise two, three or four single-ply units (2z-2s-Z, 2z-3s-Z, 2z-4s-Z), but other combinations have been encountered. From textile technology we know that the tensile strength of a re-plied thread is considerably higher than that of a single-ply thread containing the same mass of fibres.

The material of the sewing thread, namely flax and hemp which are the most obvious sources in Europe, is often mentioned in the bookbinding literature but seldom on the basis of analysis. Since simple microscopic methods for their identification are not reliable, the drying-twist test (see Chapter 6, note 9) was applied.[11] In 15 samples from bindings in St Gall StfB, ranging from the eighth to the twelfth century, flax was found exclusively, a result not surprising in view of the extensive linen industry in the St Gall area in the Middle Ages. Hempen thread was identified in a single case only (Adorisio and Federici 1980, Udine, Archivio Capitolare Cod. 3; s. xi–xii).

7.5 ENDLEAVES

After finishing the sewing of the bookblock and anchoring the supports in the lower board, the binder would probably proceed by reinforcing the board attachment by affixing the pastedowns to the inner board face. Unfortunately, endleaves often fell victim to mutilation, removal or replacement: out of the 130 carolingian bindings studied, only in 72 (55 per cent) could the original state of their endleaves be reconstructed. Considerable variations were observed: in many cases the endleaves are an integral part of the textblock, as they are formed of the first leaf of the first quire, often ruled but left uninscribed, and the last leaf

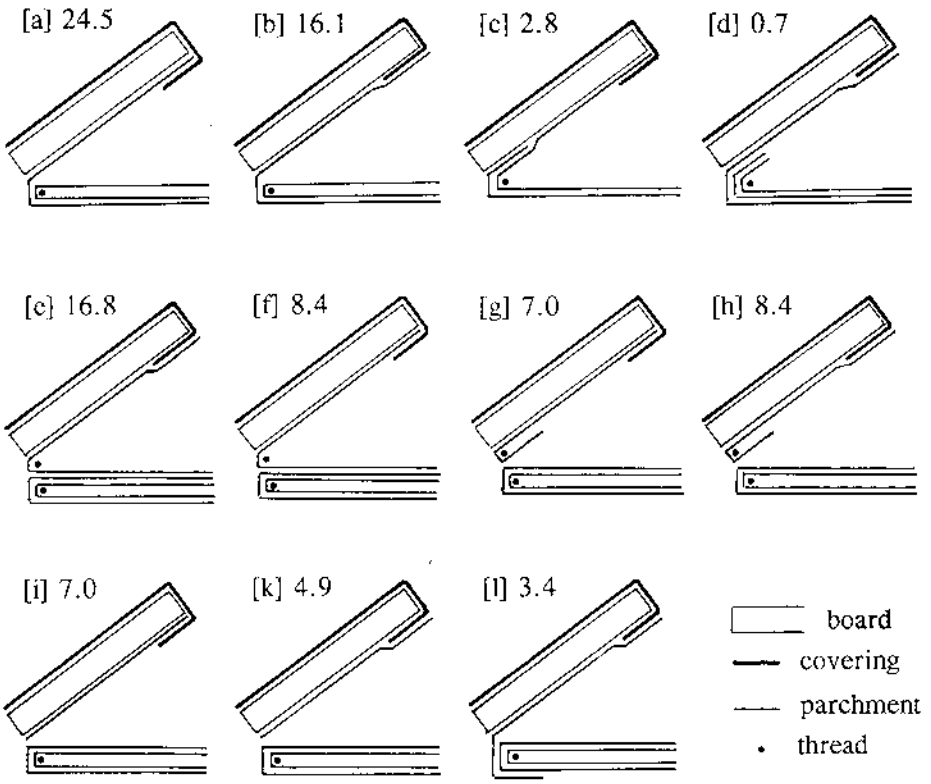

Figure 7.18 Endleaf constructions of 72 carolingian bindings (the numbers represent percentages).

(or several leaves) of the last quire (Figure 7.18[a] and [b]). The last quire can vary in composition, depending on how the scribe managed to finish the text; he might have removed blank leaves if he ended up with too many of them, [c] and [d], or – if short of space – hooked a single leaf around the last quire to serve as pastedown [l]. If the scribe had not provided blank leaves, the binder might have added a separate endleaf quire, which usually comprised a single bifolium, but occasionally a stubbed leaf only, [e] to [h]. In a small number of cases the pastedown consists of a single sheet, unconnected with the textblock and only introduced to control warping of the board, [i] and [k].

In half of the bindings studied the pastedowns are underneath the turn-ins, a feature characteristic of carolingian bindings; it was noted in the early studies by Heinz (1938) and Kattermann (1939) and was later confirmed by van Regemorter (1948) and Vezin (1970). The chi-square test showed that pastedowns underneath the turn-ins occur significantly more often in carolingian bindings of the earlier period ($\chi = 4.9$). This was further corroborated by detailed studies of about 60 bindings from Freising by Schäfer (1994).

None of the 130 bindings in my own series had reused manuscript leaves as pastedowns; these were found to be of blank parchment like those of the Freising bindings

(Schäfer 1994); however, Schäfer observed several instances of discarded manuscript leaves employed in rebindings from the eleventh century.[12] McKinlay and Rand (1938) argued in an elaborate study that a ninth-century Juvenal fragment was used for pastedowns in a ninth-century codex (Orléans BM MS 295); however, they failed to recognize that the binding is not contemporary but is a later rebinding, as is evident from the reused boards with a gothic-type attachment.

7.6 EDGE TRIMMING

Virtually no information is available on how edges of the bookblocks were trimmed, except for some slightly curved oblique score marks which could offer some clue. Such marks have been casually observed in the past (Middleton 1963 p. 80; Helwig 1970 p. 32; Pollard 1976 p. 61; Cains 1984 pp. 76–8) and tentatively attributed to the use of a chisel, plane or knife; Adam (1927 p. 4) was quite firmly convinced that the edge-trimming tool had been a

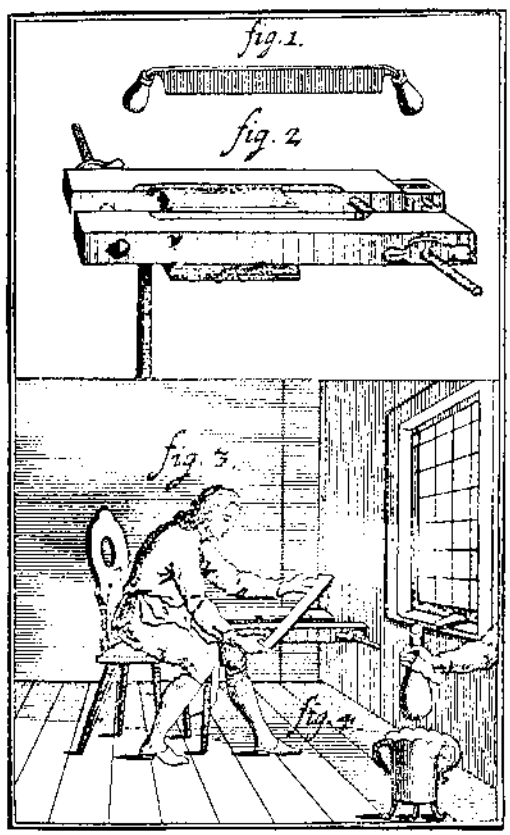

Figure 7.19 The drawknife employed for trimming book edges (from Prediger's *Buchbinder und Futteralmacher* [. . .] vol. 2, 1751, pl. 8).

drawknife. Score marks found on various fifteenth- and sixteenth-century bindings were suggested to be the result of the use of such a tool (Gnirrep and Szirmai 1989; Szirmai 1988a; 1990a). The earliest reference to edge trimming with a knife is given in an eleventh-century Islamic source (Bosch 1961; Bosch and Petherbridge 1981; see section 5.1); in Western binding literature, Zeidler (1708 p. 82) informs us that '*Ehe der Schnitthobel erfunden, haben die Alten sich eines scharffen Schnittmessers, fast wie es die Wagner haben, zum beschneiden ihrer Bücher bedienet*'. He explains further that several strokes were required that inevitably left score marks behind. Prediger (vol. 2, 1751 pp. 52–3) provides a description of the drawknife which he had seen in use for cheap work during his young years in Nuremberg. His illustration (Figure 7.19) shows the drawknife and the cutting press with iron-lined cheeks to prevent damage by the knife; Prediger points out that the knife was drawn obliquely and that the press was hung on a hook in the wall to withstand the drawing force. On following this procedure with a modern drawknife, I found that it takes great physical strength to wield the knife and cut away a few millimetres of the edge. The depiction of edge trimming with a drawknife in a fresco in the Vatican Library (H. Petersen 1988 p. 70), dating between 1587 and 1590, shifts the evidence of its use to over a century

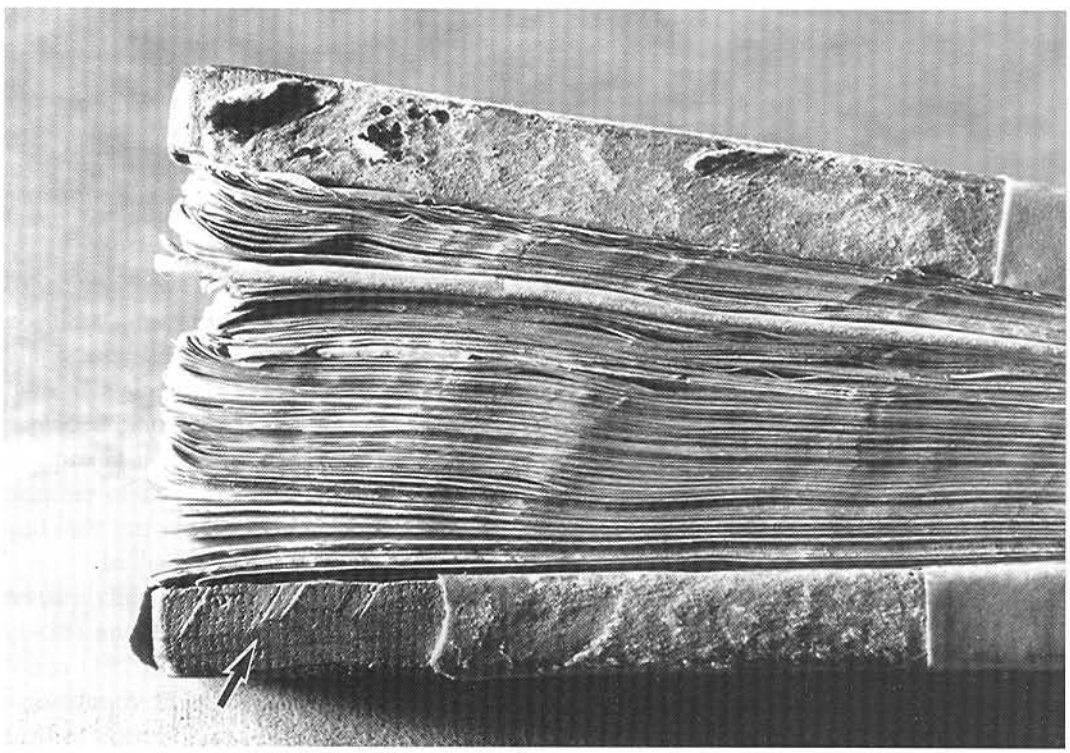

Figure 7.20 Head edge of SG Cod. 459 (s. x) with oblique score marks from the drawknife. Marks on the lower board (arrow) seem to run from the bookblock onto the edge; perpendicular year rings indicate that the board was cut on the quarter (from Szirmai 1995).

earlier. Still earlier are data from inventories of binderies, the oldest of which probably dates from the second half of the fourteenth century.[13]

In 71 of the 130 carolingian bindings studied, slightly curved score marks were detectable on at least one of the edges, usually the head or tail and sometimes additionally on the fore-edge. My assumption that these are marks of a drawknife is admittedly an extrapolation from evidence of later times presented above. On carolingian bindings the practice must have been slightly different, since they had to be trimmed with the boards already attached. The drawknife was probably drawn along the board edge, as suggested by the finding on two bindings of score marks that continue from the edge of the bookblock onto the board edges (Figure 7.20). This accords with the observation that bookblock and boards are flush: in 73 St Gall bindings the height of the bookblock was on average 3.4 mm less than that of the boards (including the leather covering), the difference being probably due to the thickness of the leather. As a rule the trimmed edges were left blank; in about eight cases traces of yellow colouring were observed, but it is possible that these are the result of later refurbishing.

7.7 ENDBANDS

After edge trimming, the next step was the construction of the endbands, meant to consolidate the head and tail of the bookblock that were left without sewing beyond the change-over stations. Heinz (1938) described the most unsupported type of carolingian endband, which is essentially identical to the Coptic endband (see section 3.5, Figure 3.6), but with the difference that the first is worked over a leather tab lining. Helwig (1970 p. 32) men-

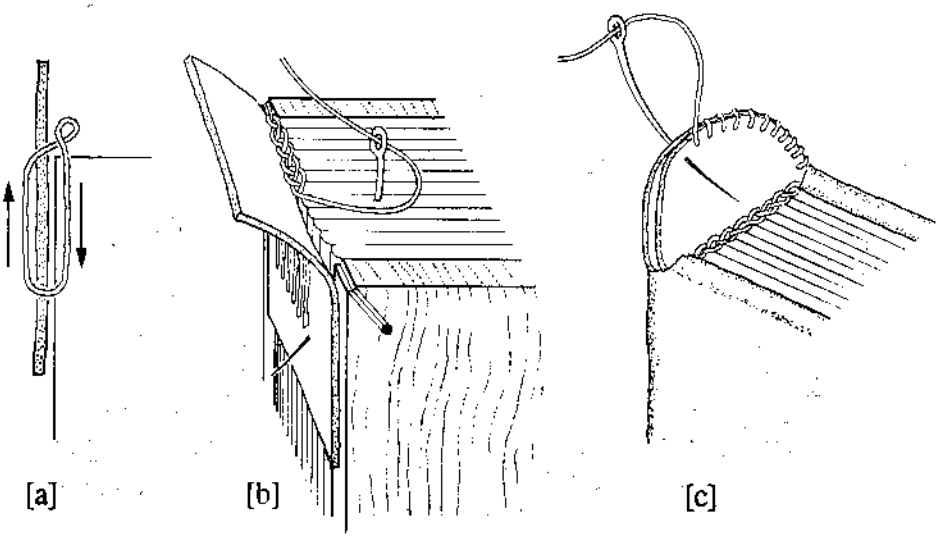

Figure 7.21 Construction of the unsupported carolingian tab endband: [a], cross-section of the tab linings and the thread motion of the endband sewing; [b], actual sewing process; [c] whip-stitch perimeter sewing (from Szirmai 1995).

tions it briefly, Jäckel (1975) and Gast (1983) provide greater details of its construction. The tab lining consists, as a rule, of a piece of the same chamois leather as that of the covering; its width corresponds to that of the spine, its height covers part of the spine (*c.* 40 to 70 mm) and protrudes *c.* 30 to 50 mm over the edge to form a tab, later often connected to the back covering. Figure 7.21 illustrates the construction of the unsupported tab endband. The thread is anchored in the corner of the boards, the lacing path usually consists of a single hole and shallow channel, [b], but can be identical with the V-shaped attachment of the main supports (see Figure 7.23[b]). The endband sewing produces a chain of links securing the outermost edges of the consecutive quires (Figure 7.21[b]); finally, after covering, the tab lining and the extended back covering are shaped and usually sewn together at the perimeter, [c].

In the 130 examples studied, the endband sewing (always through a tab lining) could be identified in 125 cases. Three main types were encountered: (a) unsupported endband sewing, (b) supported herringbone sewing and (c) supported straight sewing. The unsupported endband type described above was observed on 40 bindings, with slight differences in the appearance of the sewing. These differences turned out to be due to the use of extended link-stitching: three endbands are of one-step type (Figure 7.22), 23 of the two-step and 14 of the three-step variety (see section 3.5, Figure 3.6). The latter is easily confused with the supported endband sewing of the herringbone type, which was found in 45 out of the 125 cases. The diagram of Figure 7.23 explains the construction principle of the supported endband: the double support consists, as a rule, of (often quite thin) cord; it is anchored in the corner of the boards using mostly a lacing path similar to board attachment Type I, with a loop in one of the boards and the two ends pegged in the other. The sewing follows the pattern of the usual herringbone sewing of the bookblock (Figure 7.24).

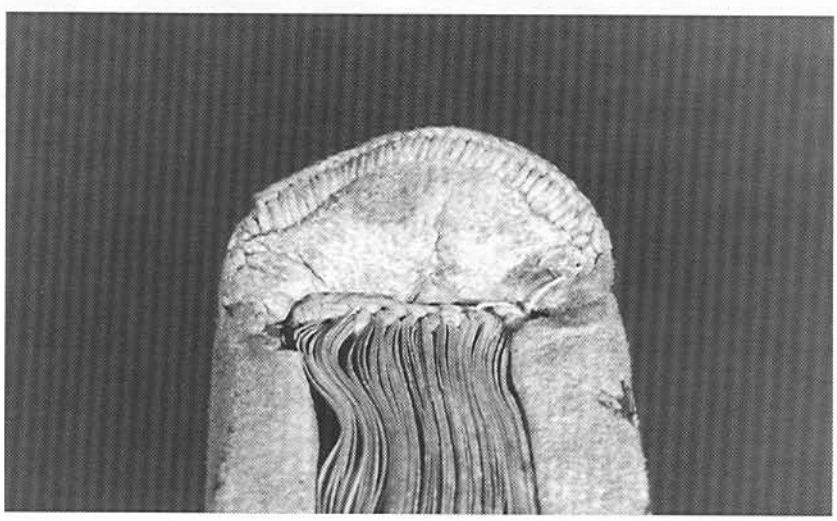

Figure 7.22 Unsupported carolingian tab endband (one-step link stitch; BLB Reich. 171, s. ix).

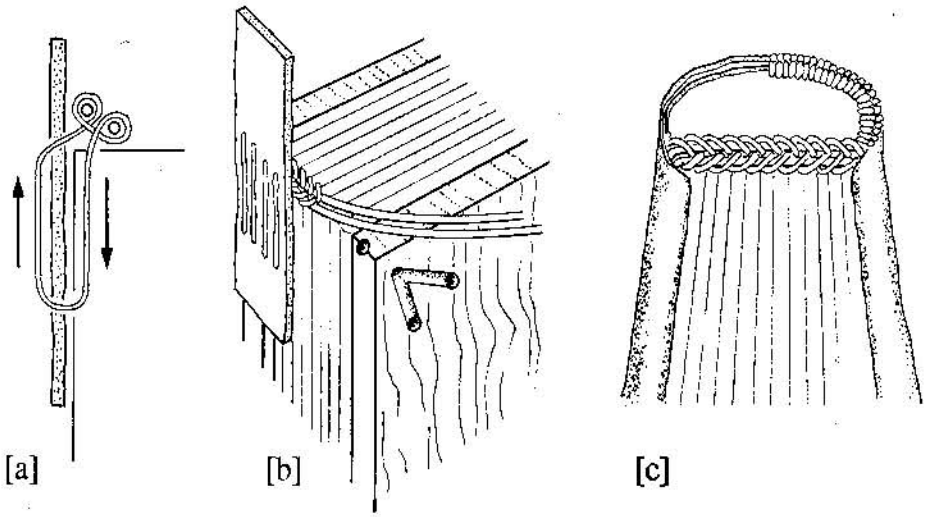

Figure 7.23 Construction of the supported carolingian tab endband (herringbone type): [a], cross-section of the tab linings and thread motion; [b], actual sewing process; [c], finished endband sewing with half-finished perimeter sewing (from Szirmai 1995).

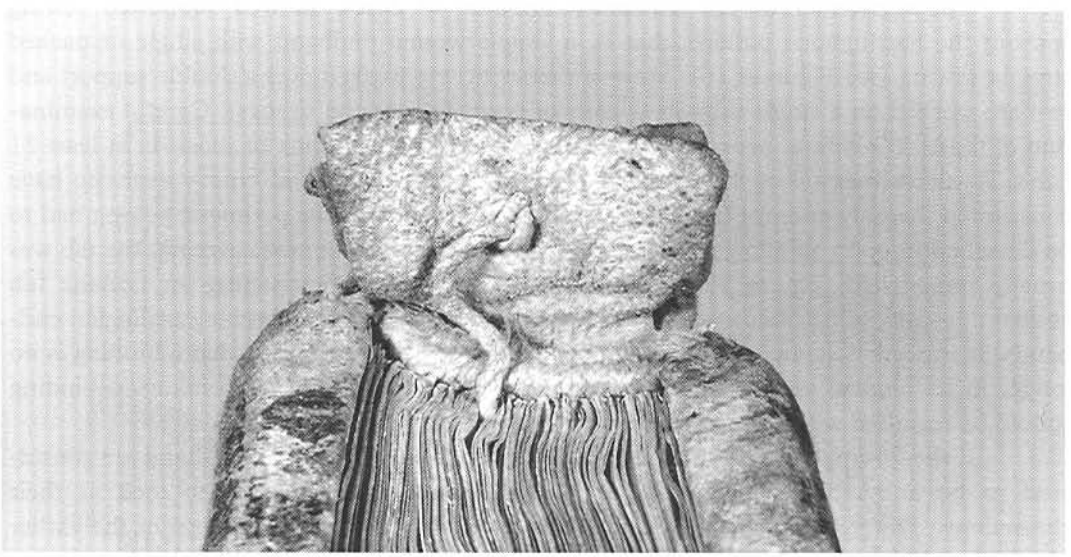

Figure 7.24 Supported carolingian tab endband with herringbone endband sewing (SG Cod. 95, s. ix). There is no perimeter sewing; a bookmarker of twisted cord is attached to the tab.

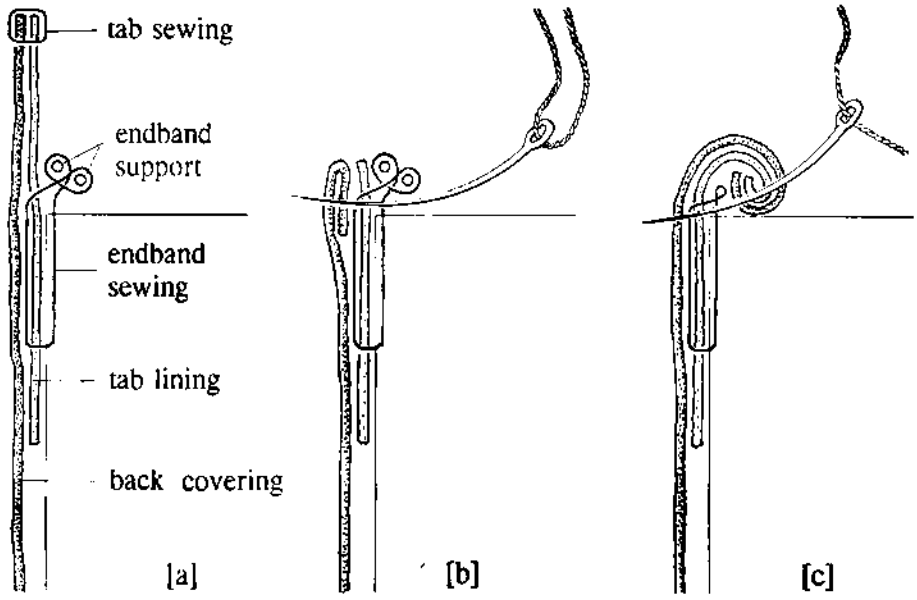

Figure 7.25 Two methods of consolidating a carolingian tab endband after lifting the back covering for repair: [a], cross-section of a sound tab endband; [b], the tab is cut flush, the back covering turned in and the two joined by saddle-stitching; [c], tab linings and back covering are rolled and stitched up together (from Szirmai 1992c).

The remainder of the endbands, another 40 cases, showed supported sewing without the herringbone pattern, that is, a simple wound endband with single or packed straight sewing (see Figure 8.16). Most of them (38) are worked over a double support and two are worked on a single support usually of cord (four are on thongs). Careful examination of these 40 bindings provided convincing evidence of rebinding or repair in at least 21 cases. At times renewal of the endband – usually a straight wound type – seems to have constituted the only attempt to stabilize a worn-out binding. If the perimeter sewing had to be detached in order to allow repair of the spine or to provide a new covering, the tab was usually remodelled: Figure 7.25 illustrates two ways of reconstructing an undone tab endband, resulting in structures which should not be mistaken for genuine carolingian endbands. It appears that such modified endbands are a reliable indication that a binding is no longer in its original state; similarly, a wound type of endband on a carolingian binding should be regarded with suspicion (Szirmai 1992c; see also section 7.10).

If the unsupported and the supported herringbone types of tab endband are considered to be authentic carolingian structures, it would be of interest to look at their chronology. Thirty-five of the 40 unsupported endbands belong to bindings of the earlier group, the chi-square test giving a significant result ($\chi = 6.05$), which warrants the conclusion that the unsupported endband had preceded the supported herringbone type. This development reflects the chronology of the sewing of the bookblock, supporting the contention that the herringbone sewing had evolved from the unsupported link-stitch sewing.

The thread of the endband sewing in the 130 bindings studied was always un-dyed. Its structure was determined in 103 cases: in 60 cases it was identical to the thread of the bookblock sewing, in 43 it was different, mainly in respect of the twist direction. Yet differences in the structure of the threads for bookblock and endband sewing cannot be used as criteria for authenticity, as we know of original endbands sewn with threads different from those of the bookblock sewing.

The tabs of the endbands have suffered great damage and mutilation as a consequence of having been inappropriately kept on shelves in an upright position.[14] Only 96 of the 130 bindings studied have preserved the tabs sufficiently intact to determine their shape and the presence or absence of perimeter sewing. Tabs assume almost any shape between round and square (Figure 7.26[a] to [f]. Perimeter sewing is or had been present in only 32 cases, significantly more often in tabs of the rounded shapes (chi-square test, $\chi = 35.9$). Tab shape and the presence or absence of perimeter sewing have no chronological relationship. The most common types of perimeter sewing are illustrated in Figure 7.26 [g to i].

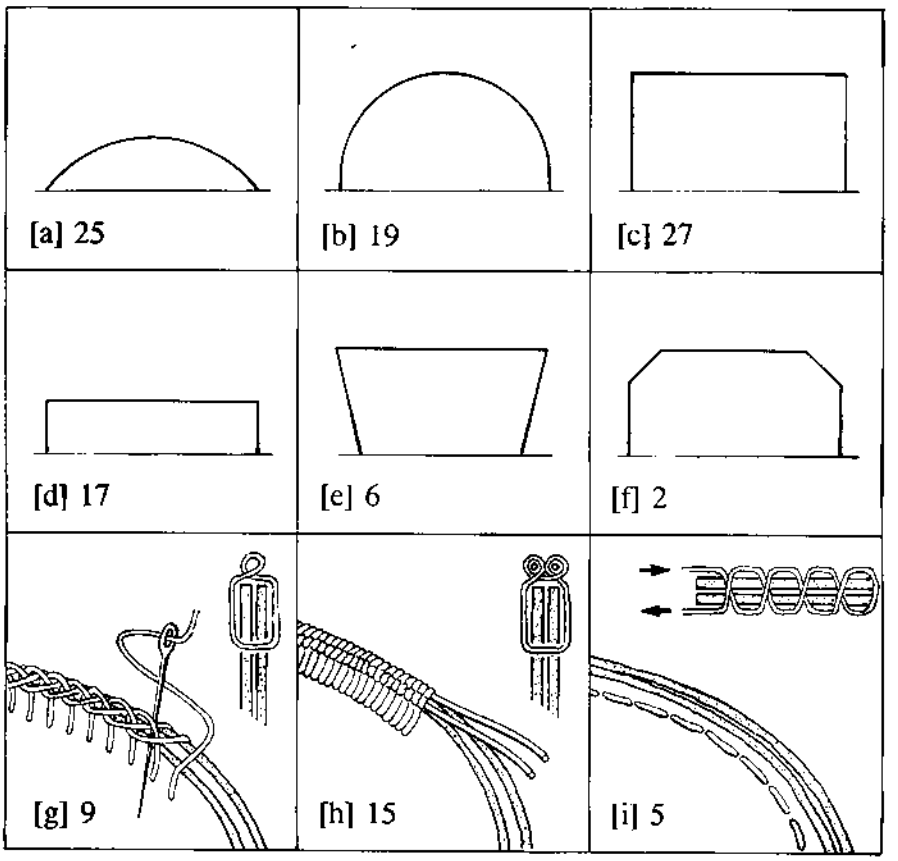

Figure 7.26 Tab shape and perimeter sewing of carolingian tab endbands. The shapes [a] to [f] were recorded on 96 bindings; 32 bindings have perimeter sewing, the most frequent types being: [g], link stitch, [h], buttonhole with crowning cores and [i], saddle stitch (from Szirmai 1995).

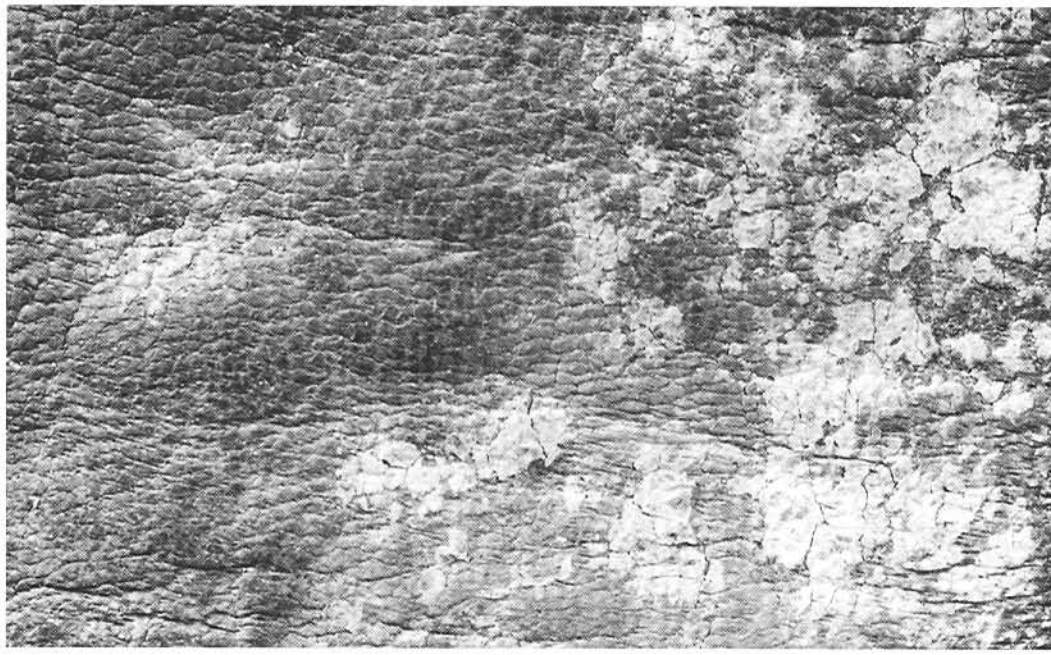

Figure 7.27 Remnants of crude starch paste on a loose patch lining (surface facing the spine; SG Cod. 137, s. x); magnification 4.5 times (from Szirmai 1995).

Lining of the front of tabs with textile and perimeter sewing with coloured threads are seldom encountered on early carolingian bindings, but occasionally on later ones (SG Cod. 146, s. x; SG Cod. 354, s. xi) and particularly on treasure bindings like the Mondsee Gospel Lectionary (Baltimore WAG MS 8; Clarkson 1978a; 1978b). Some reports mention endband sewing in one or more colours; yet these often concern bindings repaired at a later period (Vezin 1970, rebound manuscripts from Corbie) or codices of a later date, like Modena, Archivio Capitolare MS O.IV.1 (s. xi/xii; Federici and Pascalicchio 1993).

The tab was often used for attaching bookmarkers: they were observed in 40 out of 96 preserved tabs (17 actually present, 23 cases of relevant holes). Most markers were in the form of thongs of chamois leather and only a few were made of cord (see Figure 7.24). A thong marker still attached to the tab is mentioned by Barbier (1982 p. 234) on a St Amand binding (Valenciennes BM MS 518).

Out of the 96 cases where the endband tabs could be examined, in 80 bindings they were patch linings restricted to the head and tail segment of the spine; in seven bindings patch linings are also found between the sewing supports, whereas in another nine bindings the endband tabs are continuous with a full-length spine lining. Such full-length spine linings were described on two Würzburg bindings by Vezin (1985). The majority of the tab linings is held in position seemingly through the endband sewing only; in a few instances (7) the width of the tab linings extends onto the spine edge of the boards where they are fastened with trenails; the latter were used in one case with a continuous lining.

Tab linings extending onto the outer face of the boards and their fixation by the support slips have been recorded on Brussels BR MS 5413–22 (Gilissen 1983 p. 66, pl. XXV).

Whether or not adhesive had been used to affix the spine linings is a matter of conjecture. Tab linings or continuous linings may be fixed more or less firmly to the spine by the endband sewing alone, but with patch linings the use of adhesive seems to be quite inevitable. Indeed, residues of flour paste have been found on loose patch linings in several instances (Figure 7.27): even if only single pieces of evidence, they give good reason to question the general validity of the statement that no adhesive was used on the spine of carolingian bindings.[15] Starch paste is not the strongest adhesive and is subject to hydrolytic degradation on aging and by biological agents; it would hardly be surprising if, after hundreds of years, it had become sheer dust on the highly mobile spine structure.

7.8 COVERING AND DECORATION

The vast majority of carolingian bindings are covered with leather designated as 'chamois' or 'buckskin'; today these often relatively thick and stiff leather coverings (up to 2 mm) have a muddy yellowish-grey colour and an abraded surface so that the species of origin cannot be determined (Figure 7.28[a]).[16] The assumption that these leathers were made from hides of wild animals is supported by archival sources, like Charlemagne's edict of AD 774 that granted the Abbey of St Denis the use of deer- and doeskins from their forests for covering the books (Lesne 1938 p. 374, cites several other examples).

A smaller number of carolingian bindings has a covering of white leather with a different but well-preserved grain structure and follicle pattern (Figure 7.28[b] and [c]); these clearly differ from the structure of domestic species like goat or sheep and are assumed to derive also from wild animals (at times traces of hair are still present). In a few instances such skins have a brown colour characteristic of vegetable tannage. Very few codices, mostly of later dates (eleventh or twelfth centuries), have a covering of wool- or hair sheep; rarities are a single case of a covering with decorated leather tapestry, probably of hair sheep

Table 7.3 Coverings of 130 carolingian bindings

Material	*Number*	*Per cent*
Chamois, no grain on either surface	95	73.1
White leather, grain of wild animals	20	15.4
Brown leather, grain of wild animals	7	5.4
Brown leather, goat or hair sheep	3	2.3
White wool sheep	3	2.3
Parchment-like	2	1.5
Total	130	100.0

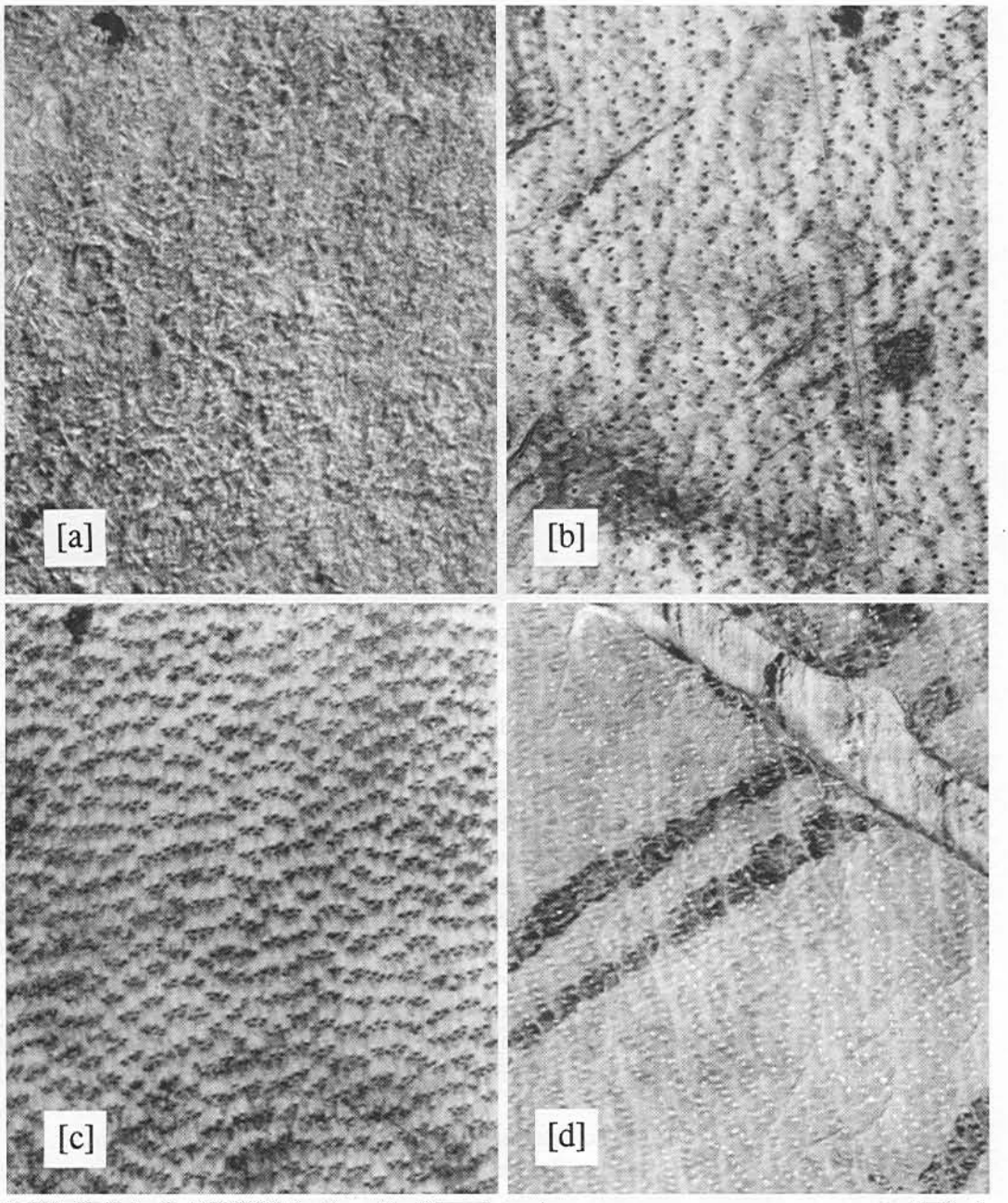

Figure 7.28 Surface structure of leather coverings of carolingian bindings: [a], chamois leather (abraded surface exposing the fibre structure; SG Cod. 426, s. ix); [b], single rows of hair follicles (mountain goat?; SG Cod. 5, s. xi); [c], double rows of hair follicles (deer?; SG Cod. 186, s. ix); [d], tapestry covering decorated with black ornament, hair sheep (SG Cod. 354, s. xi). Magnification: 4.5 times.

[d] (SG Cod. 354, s. xii/xiii; Szirmai 1992b), and a cover with cut-leather decoration probably on a vegetable-tanned calf (SG Cod. 235, s. ix). It is likely that skins of domestic animals were reserved for the manufacture of parchment, meeting a demand for writing material rather than for book covering.

Whereas the covering material leaves us with unanswered questions, we can learn more about the covering procedures. Leather was obviously scarce and expensive, hence patchwork was not shunned: for example, the binding of BLB Reich. 112 (s. viii/ix) is covered in two pieces of leather in which a saddle-stitched seam runs down the whole length of the back; many more such examples could be added. In 123 cases where the turn-ins could be observed, 75 per cent have their edges left irregular and 25 per cent have them trimmed out. Differences in workshop practice are evident in the making of the corner turn-ins (Figure 7.29). The majority are mitred corners made with a single cut of the knife [a]; this method is so distinctive of St Gall and Reichenau bindings that it may claim to be an important characteristic of a given workshop. Stitched mitred corners [d] and those fastened with trenails [e] are exceptional and often encountered on repaired or newly covered bindings. Vezin (1985) considers stitching of mitred corners (BSB Clm 6260 and 6261) to be a later technique and the trenails found on Torino, BN Universitaria MS G.V.20 are suggested to be a later addition on a re-covered binding (Federici and Pascalicchio 1993). Lapped corners [b] and [c] seem to be characteristic of bindings from Salzburg and Freising. Occasionally, the inner board surface between the turn-ins is filled with a gesso-like material (SG Cod. 177 and 398; BSB Clm 6223; ÖNB Cod. 484).

* * *

Many of the leather-covered carolingian bindings remained undecorated, except for titles on the back, documented in the case of bindings from Freising, Fulda, Reichenau and St

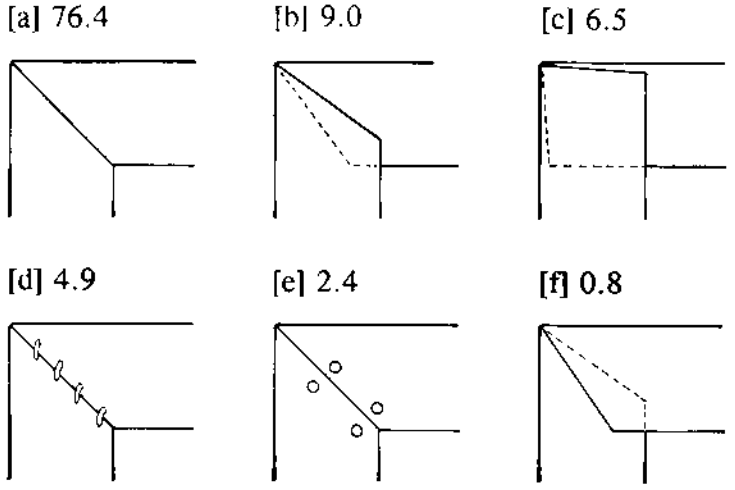

Figure 7.29 Corner turn-ins observed on 123 carolingian bindings (numbers represent percentages; from Szirmai 1995).

Gall (Christ 1937 pp. 87–90, p. I), bindings from Salzburg (Unterkircher 1954 p. 42, pl. VII) and bindings from Corbie (Vezin 1970 p. 112). These were humble books for everyday use, such as reading at mealtime in the refectory as evident from the inscription *ad mensam* of SG Cod. 117. In contrast, many lavishly illuminated carolingian manuscripts are bound in treasure bindings, worked in precious metals and embellished with jewels and ivory.[17] Other bindings, an intermediate category, are decorated with blind tooling (for technical details see Chapter 5, note 11), as first observed on Freising bindings (Leidinger 1924). Endres (1936) described the blind tooling on the only example of Würzburg Dombibliothek which survived the 15th-century rebinding scheme. Christ (1937 pp. 90–102, pl. II) recognized the ornamental, floral and animal elements as generally associated with carolingian art, and recorded a total of 47 tooled bindings from Fulda, Freising, Reichenau and St Gall. His sample was soon enlarged to 78 relevant bindings (G.D. Hobson 1939 pp. 214–33). Studies with further details of bindings from Salzburg (Unterkircher 1954), from Reichenau and St Gall (Kyriss (1961; 1966) and on French bindings (Vezin 1970; Barbier 1982) have been published. In his survey of blind-tooled carolingian bindings Vezin provides a comprehensive list of about 125 examples (Vezin 1988a; see also Vezin 1989 for an illustrated review). Out of these 125 decorated bindings more than 50 originate from Freising; the others are from Corbie (15), Fulda (8), Salzburg (6), St Amand (5), St Denis (3) and Reichenau (2), the remainder are scattered single examples only vaguely assigned to a geographical area. This distribution probably reflects chance survival and does not allow any general conclusion as to the practice of decoration in various workshops. In the St Gall material decoration is conspicuously absent: out of 110 bindings only 10 are blind-tooled, virtually all of them being foreign (Mainz, Fulda, Chur, Auxerre and several others from France). Technical details of these 10 bindings concerning board attachment, turn-ins or fastenings provided corroborating pieces of evidence for their origin from other workshops. Most bindings from the nearby Abbey of Reichenau are also undecorated (Kattermann 1939).

Although leather covering on the extant carolingian bindings is the rule, many had been covered with precious textiles. Such coverings were sometimes part of treasure bindings, like Bamberg StB Lit. 131 (s. x) with remnants of silk brocade under decorated silver plates (Steenbock 1965 no. 34), the Theophanu Evangeliary (s. xi) in Essen (Steenbock 1965 no. 62) and the Mondsee Gospel in WAG (Muthesius 1978). Silk was the original covering of the Evangeliary St Maria in Via Lata (Vat. Cod. I 45; Supino Martini 1980; Bozzacchi 1985); red damask served as background for silverwork on Modena, Archivio Capitolare MS O.IV.1 (s. xi/xii; Federici and Pascalicchio 1993). But even less sumptuous bindings might have textile coverings: Endres (1942) described the damaged silk covering of Würzburg UB Mp.th.f. 65; another example is SG Cod. 398 (s. xi) with its badly damaged yellow-green-red brocade covering applied over a white sheepskin. A very similar but less damaged binding is Princeton UL Garrett MS 43 (s. xi) with a patterned green-red silk covering over tawed skin.[18]

7.9 FASTENINGS

Fastenings are a regular feature of carolingian bindings, though they have seldom survived in their original state; usually vestiges of leather straps, recesses in the boards and metal pegs in the board edge (or their redundant holes) are the only witnesses. Of the series of 130 bindings studied, only seven have no evidence of fastenings (in another five it could not be determined); 92 showed vestiges of earlier fastenings, 26 bindings – all from St Gall – have preserved their fastenings. No complete fastening has been recorded in other collections, except for two slightly different clasps on a ninth-century Evangelistary (Gabriel 1991, fig. 2; Berlin, Staatliche Museen, Kunstgewerbemuseum Inv. Nr. 88:634); traces and remnants similar to those mentioned above have been observed on some 25 bindings in Paris (Vezin 1970), Valenciennes (Barbier 1982) and in Italy (Federici and Pascalicchio 1993). The objects described by Ramskou (1959) as book fastenings from Viking times in archaeological finds from Scandinavia obviously served a different purpose; likewise, the finds from Hitzacker (Northern Germany, s. xi) are unlike any known fastenings. In contrast, a bronze ring plate (as in Figure 7.30[n]), described as a belt tongue by Capelle

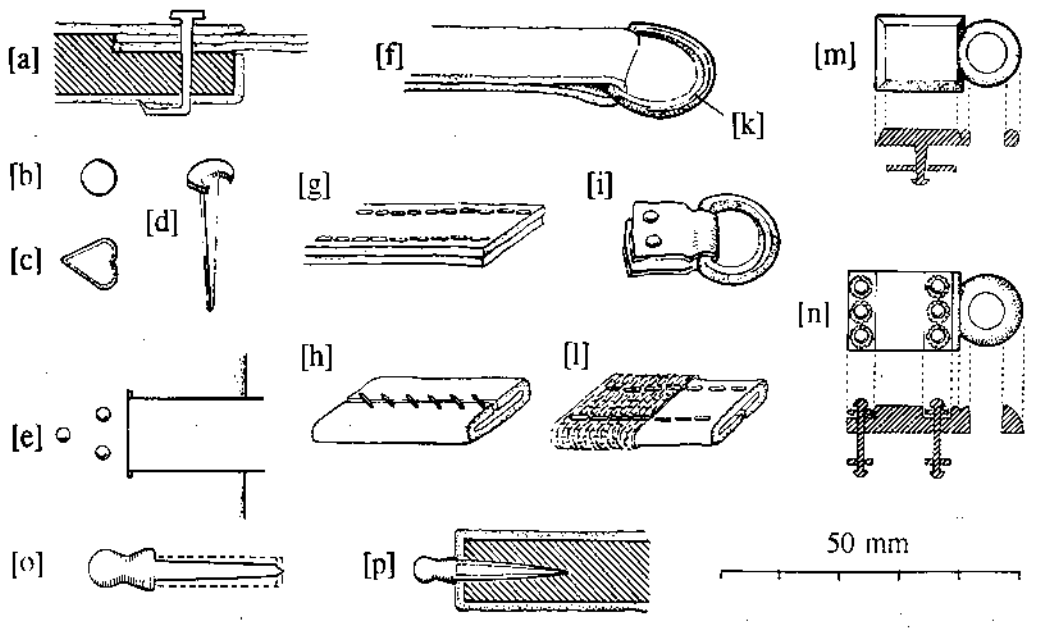

Figure 7.30 The construction of carolingian fastenings: [a], cross-section of the strap attachment in a recess at the board edge; [b], round head of iron nail (SG Cod. 143); [c], heart-shaped head of iron nail (SG Cod. 89); [d], brass nail with half-moon-shaped head (SG Cod. 127); [e], strap attached with three rivets at some 25 mm from the edge (SG Cod. 457, from Fulda); [f], folded strap with iron ring [k] (SG Cod. 97); [g], double strap with saddle-stitching (SG Cod. 185); [h], whip-stitched double strap (SG Cod. 127); [l], the same as [h], covered with textile and saddle-stitched (SG Cod. 211); [i], iron ring with riveted iron plate (SG Cod. 116); [m], iron ring plate; [n], bronze ring plate attached with bronze rivets (SG Cod. 95); [o], iron peg with flattened shaft (SG Cod. 154); [p] bronze peg shown in cross-section in the edge of the lower cover.

(1976, no. 311), is undoubtedly a genuine piece of a carolingian fastening; dated to *c.* 800, it was found during excavations in Domburg on Walcheren in the Southern Netherlands.

The construction of carolingian fastenings (Figure 7.30) is as follows: the hasp (i.e. the moving part) consists of a leather strap, lodged in a recess on the upper board underneath the covering, the end of which is fitted with a metal catch; the fixed part is a metal peg driven into the front edge of the lower board. The leather of the strap is the same as that of the covering: it may be a folded thong holding the catch in-between, [f] and [k], or it may comprise two thicknesses stitched together with the catch riveted onto the thong, [g] and [i]. Occasionally vestiges of coloured textiles can be observed which originally enveloped the strap, [l]; such multi-layered stitched straps of leather and silk were noticed by Federici and Pascalicchio (1993). The straps are fastened with one, two or three iron or bronze rivets of various shapes, [b] to [e]. The catch can be of wrought iron or bronze and consists of a ring, [k] and [i], or a ring plate, [m] and [n]; in a few cases the ring plates are of horn or ivory. The pegs are either of wrought iron or of brass, with a bulbous head and the flattened shaft driven into the board, [o] and [p] (see also Figure 7.31).

Out of the 26 instances of complete fastenings in the St Gall material there are at least 10 with signs of later intervention, such as repaired straps and rings; in a few cases the original two fastenings have been replaced by one only. The direction of closing could be ascertained in 120 cases. The vast majority of fastenings (111) close from the upper onto the lower cover; this large group includes virtually all bindings which originate from St Gall and Reichenau. Among the nine cases closing onto the upper cover three (origin uncertain) are evident instances of later repair; the remaining six originate from Freising (3), Salzburg (1) and Mainz (1), the origin of one is unknown. Either direction of closing was observed in other studies: the fastenings of six carolingian bindings from Italy close onto the lower cover in three cases, while another three close onto the upper cover (Federici and Pascalicchio 1993).

Carolingian bindings usually have no protective metal furnishings unless precious metals had been applied as part of the decoration, as is the case for many liturgical books. Traces of chaining usually date from a later period and can constitute important evidence for a binding's history: for example, they are a regular feature on bindings from Freising and Salzburg, but unknown on bindings from St Gall.

7.10 FUNCTIONAL ASPECTS AND REPAIRS

Having observed a considerable number of carolingian bindings which have so miraculously retained their structural integrity for over a millennium, one is tempted to try to gain some insight into their functioning. Yet, one should bear in mind that intrinsic changes in the materials due to aging and structural alterations can easily lead to erroneous interpretations. A case in point is the spine of an old binding, or rather its common distortion from a straight shape into a concave shape (Figure 7.32). In an attempt to analyse the spine shape and its effect on the functioning of the book, a semi-quantitative method was devised to rate the curvature using a transparent template (Figure 7.33[a]). The results of this rating

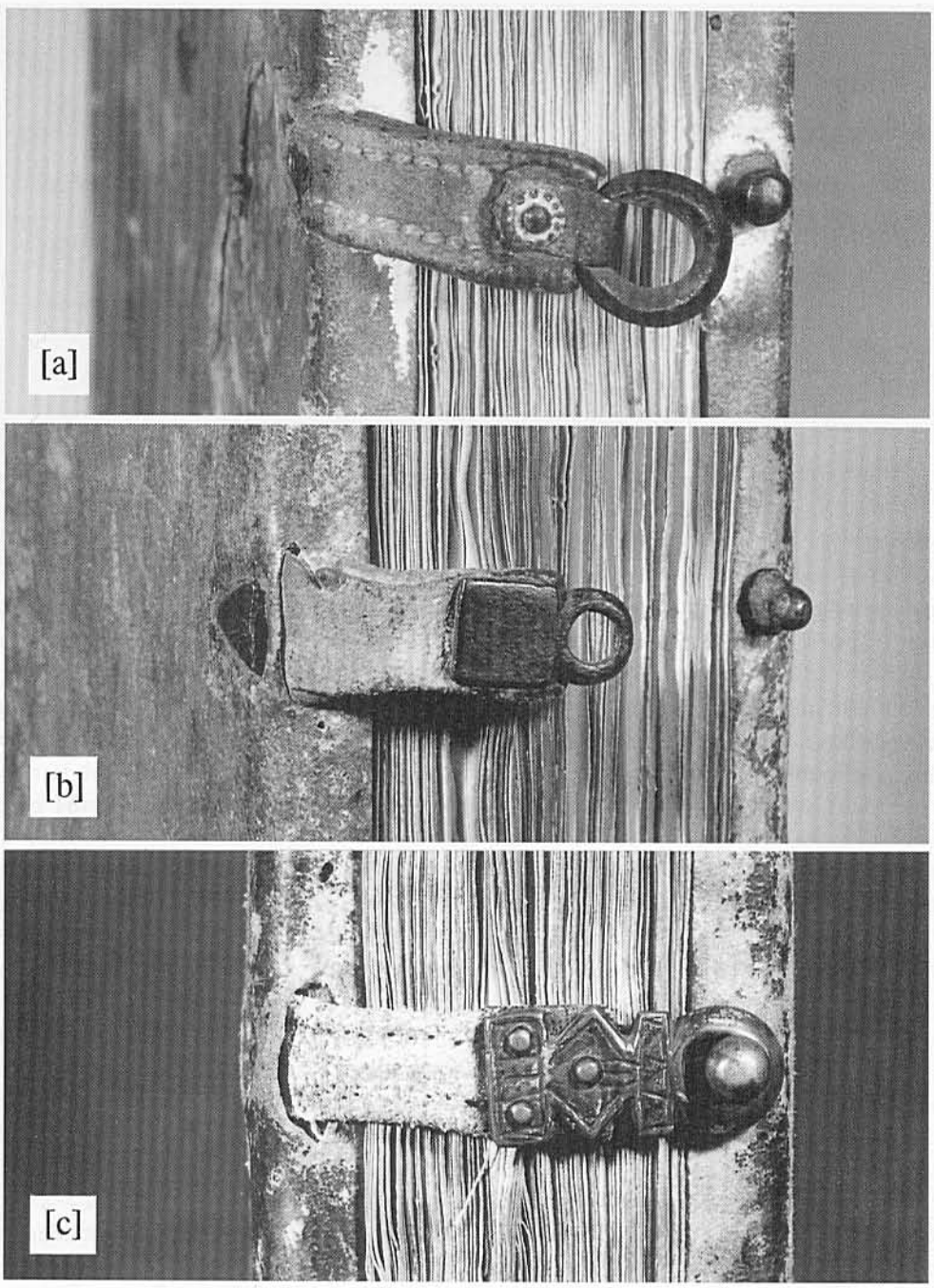

Figure 7.31 Carolingian fastenings: [a], hasp with iron ring, iron peg (SG Cod. 185, s. viii/ix); [b], iron ring-plate, strap fastened with a heart-shaped rivet, iron peg (SG Cod. 89, s. ix); [c], bronze ring-plate and bronze peg (SG Cod. 232, s. ix/x).

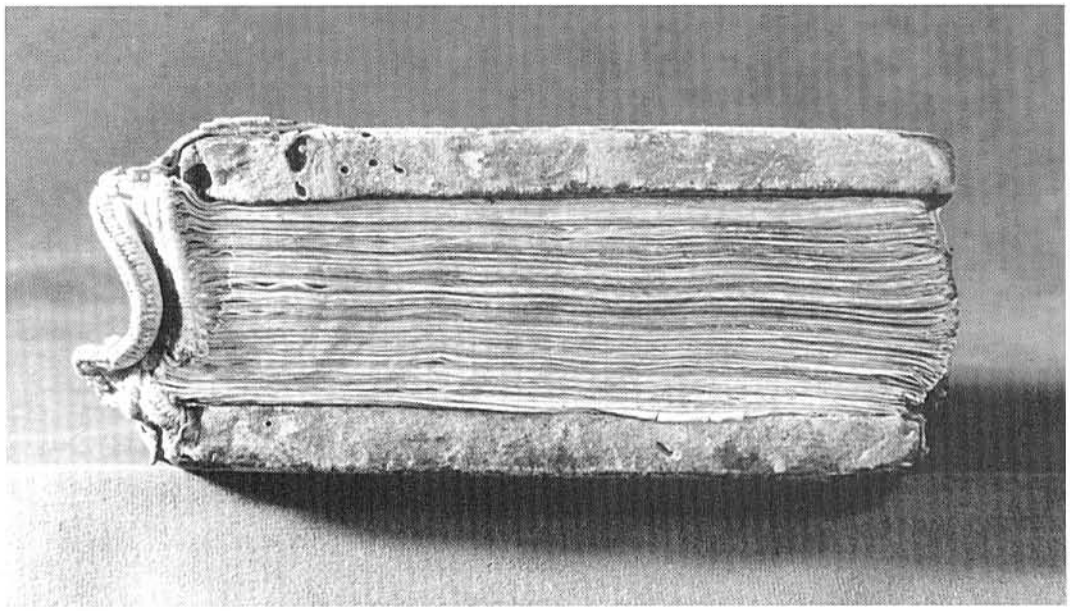

Figure 7.32 Concave distortion of the spine and bulging out of the fore-edge (SG Cod. 861, s. x; from Szirmai 1995).

revealed unambiguously that with time the majority of carolingian bindings developed concave spines [b], a phenomenon encountered likewise in bindings with unsupported sewing (see section 4.5).

One of the factors likely to contribute to the concavity of the spine is the natural

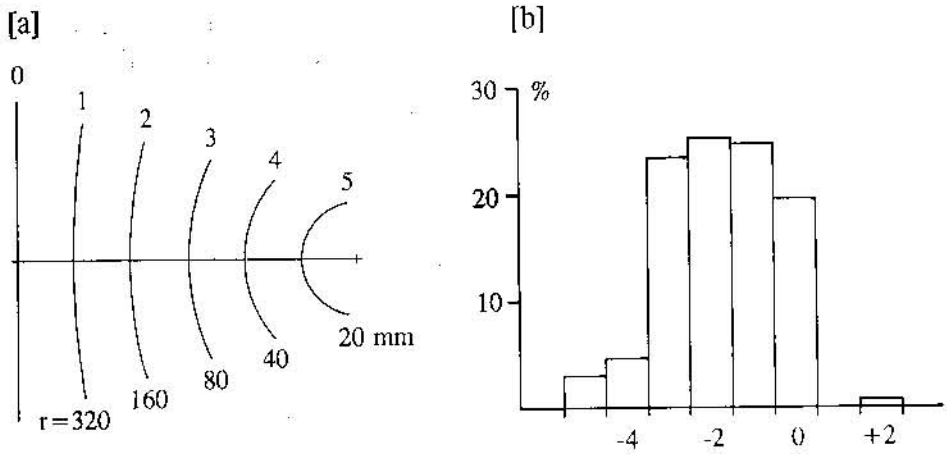

Figure 7.33 Spine shape of carolingian bindings: [a], template with circle segments of radii ranging from 20 to 320 mm, to estimate the spine shape, recorded as plus 1 to 5 when convex, or minus 1 to 5 when concave, with zero for a flat spine; [b], histogram of the spine shapes in 110 carolingian bindings (from Szirmai 1995).

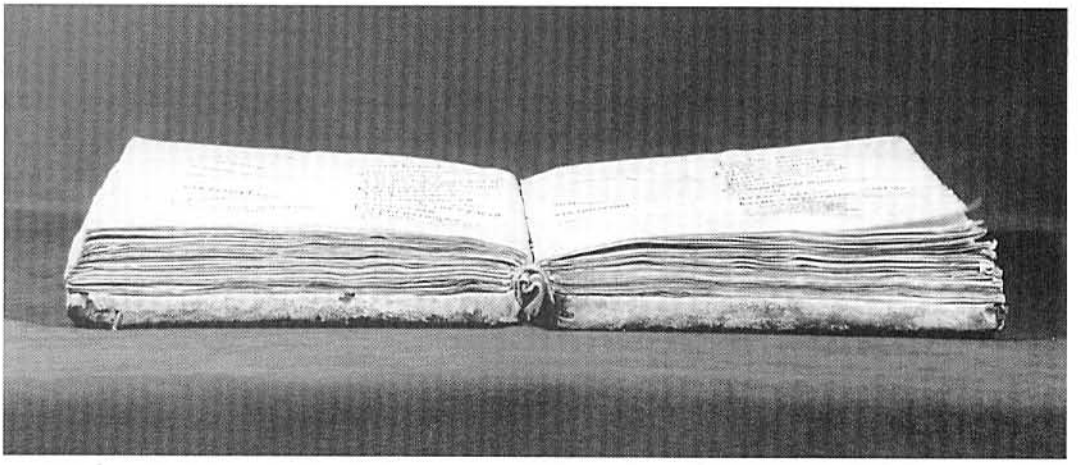

Figure 7.34 Completely flat opening of a carolingian binding (SG Cod. 17, s. ix/x; from Szirmai 1995).

tendency of parchment to regain its flat state which it assumed while being stretched and dried on the frame. This will facilitate the unfolding of sheets and contribute to the unrestricted flat opening of the codex; the spine will become raised ('throwing up') and form a more or less sharp opening arch (Figure 7.34). The mobility of the spine and the ease of opening will depend on a multitude of factors related to both the material qualities and the structure of the spine constituents, such as thickness and stiffness of the parchment leaves, quire composition, size and weight of the leaves, the sewing structure, the dimensions and rigidity of the sewing supports, the lining, covering and the type of adhesives used.

However, it is virtually impossible to assess the role of the above-mentioned factors on a thousand-year-old binding in view of the inevitable vicissitudes and intrinsic changes over time: the concave distortion of the spine, degradation of adhesives and an increased stiffness of the materials are just a few examples. Model experiments may aid in gaining some insight into the basic mechanisms of spine movement, as is illustrated in Figure 7.35. Herringbone sewing only, [a], will allow for a perfectly flat opening, the sharpness of the opening arch only being restricted by the thickness of the sewing supports; attaching the tab linings with the endband sewing, [b], softens the arch to some extent; finally, covering with leather and pasting it to the spine further widens the opening arch, but the leaves tend to lie slightly less flat, [c]. These and other similar models clearly indicate that sewing supports and linings of increasing thickness and rigidity will counteract easy opening and reduce the sharpness of the spine arch; this also reduces the strain on the sewing, but the leaves will settle down less flatly. The sharp opening angle of uncovered bindings (for example the Ethiopian codex; see section 4.5) will exert greater stress on the sewing structure but facilitate a fully flat opening. Although such considerations may provide some insight, more research is needed to fully appreciate what spine function the carolingian binder had in mind.[19]

The carolingian binding structure has the merit of having preserved its basic functioning for hundreds of years, thanks to the excellent sewing structure and the protective

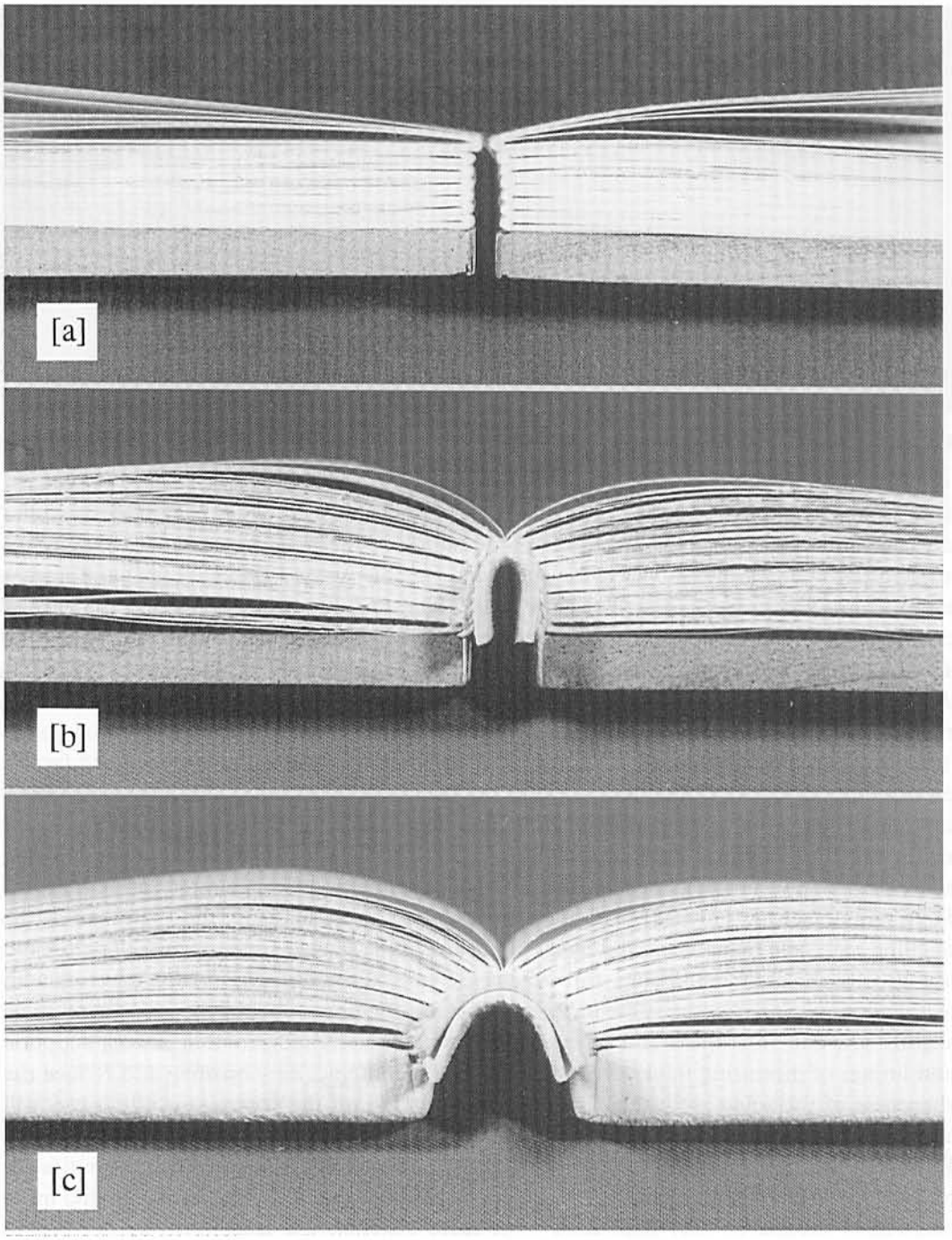

Figure 7.35 Model of a carolingian binding: [a], herringbone sewing only; [b], sewn bookblock with tab linings attached; [c], bookblock finished with leather covering.

effect of tab linings which helped to avoid excessive strain and to soften the opening arch – factors independent of the adhesive which had no lasting effect. The concave distortion, to us a negative aesthetic aspect, was a minor blemish: it sometimes caused damage to the fore-edge of the leaves by the fastening straps. A more serious cause of damage is the structure of the board attachment which predisposes it to breakage of the sewing supports at the hinge. When opening the cover to 180 degrees, considerable strain is put on the sewing supports at the hinge, due to the square spine edge of the board and the thickness of the leather covering; although the lever action that facilitates the opening of the first pages may seem a welcome effect, it was probably a major contributory factor in the weakening and ultimate breakage of the sewing supports. Broken supports were observed in about 25 per cent of the carolingian bindings of St Gall Stiftsbibliothek; usually breakage had occurred at the hinge of the upper cover and had called for the most frequent type of early repairs, which is a reinforcement of the attachment with pieces of cord (Szirmai 1992c). Such repairs had required the temporary removal of the leather covering of at least one of the boards, which almost always involved the breaking of the endband or at least the undoing of the perimeter sewing; afterwards the perimeter sewing was frequently replaced by simple saddle-stitching (see Figure 7.25). Often the repasted turn-ins fail to fit into their original position, which may directly prove that the covering had been removed, or they are fixed with trenails unusual on carolingian bindings; slashes of the mitring knife on the paste-downs that do not match with the mitred corners may also indicate that the covering had been renewed. Another piece of evidence for re-covering are tab endbands with seemingly double or triple linings: these are instances where a complete tab endband had been preserved and the new covering placed on top.

Recognizing signs of repair on medieval bindings is often very difficult and dating them even more so, but deciding with certainty whether or not one is dealing with an early full rebinding is virtually impossible, for even the sturdiest binding when used extensively will inevitably wear out in 25 or 50 years and could have been completely rebound, looking identical to the original.[20] In fact, we know of a considerable number of such rebindings, such as the eleventh-century rebindings of manuscripts from Freising (Schäfer 1994). Literary evidence of early repairs is meagre, but not entirely absent: Vezin (1970 p. 88) cites several texts, among them a twelfth-century papal decree confirming the destination of certain revenues at Corbie for the repair of books (*'ad reparationem et emendationem librorum bibliothecae'*). Later rebindings, using contemporary techniques, are obviously much more evident; this applies to the extensive refurbishing operations in the second half of the fifteenth century, that were a sequel to monastic reforms initiated by the Councils of Constance (1414–18) and Basle (1431–49), and that made use of the gothic binding techniques (see Chapter 9).

NOTES

1. *'Den Rücken entlang läuft ein grosses Zickzackornament, die gesamte Fläche ist regellos mit kleinen Palmetten und Rosetten in Blindpressung dekoriert'* (Scherer 1905 p. 11).

2. The majority of *c.* 160 carolingian manuscripts from Reichenau, now at Karlsruhe BLB, was rebound in 1457 by the two monks Pfuser and Plant; *c.* 20 bindings were repaired, but have retained most of their original structure, and were described by Heinz (1938) and Kattermann (1939). Only two of these 20 bindings (BLB Reich. 171 and 187) escaped the 'restoration' carried out between 1967 and 1978, while the rest (including BLB Reich. 111 and 233 on which Heinz and Kattermann had predominantly based their studies) were completely rebound; merely a few detached covers have been saved but no records of the restoration were kept (Szirmai 1988b).
3. Pollard (1975) introduced the use of X-rays for the study of the board attachment. In seven out of 14 bindings on manuscripts dating from the ninth to tenth centuries, lacing paths of carolingian type have been observed, mostly on reused boards. The method had precluded any distinction between the outer and inner face of the board and consequently led to many erroneous interpretations; these have been carefully corrected by Clarkson (1996a).
4. In July 1988 I studied *c.* 20 Carolingian bindings from Reichenau, now at the Karlsruhe BLB; between June 1989 and May 1992 I examined medieval bindings at St Gall StiB. Detailed analysis of the bindings of 426 manuscripts dated prior to 1200 revealed that *c.* 120 have their original carolingian binding preserved; however, 10 had to be excluded as their authenticity has been destroyed by twentieth-century restorations (see Szirmai 1990–1; 1991a; 1992c; 1992d; 1995). I have further examined *c.* 20 carolingian bindings at Vienna ÖNB (November 1991 and May 1992) and at Munich BSB (May 1992). At Oxford Bodleian Library I have re-examined in July 1992 the bindings with carolingian elements studied by Pollard (1975).
5. I thank Mrs K. Stürmlinger of the Photographic Department of the Badische Landesbibliothek in Karlsruhe for having tracked down the original photographs from Kattermann's 1939 article.
6. Petherbridge (1991 p. 405) suggested that herringbone sewing is represented on codex-shaped bronze objects from the ninth century, excavated in Mikulčice, southern Bohemia. However, the decoration with bronze wire twisted in opposite directions occurs on a great variety of such artefacts from the Great-Moravian Empire (many on exhibition at the Lobkovitz Palace in Prague). I have been assured by the Archaeological Institute of the Czechoslovakian Academy of Sciences, Brno (letter Dr Z. Klanica of 3 June 1991), that similarities of this double filigree decoration with the herringbone or link-stitch structure are merely accidental.
7. Van Regemorter (1948) based her classification of five different types of attachment on the study of only nine bindings at Autun BM. Her criteria are rather arbitrary and the descriptions are too brief and insufficiently illustrated. She failed to recognize that several of the bindings had been rebound (Marshall 1993 pp. 48ff.), so her data should be considered with caution.
8. In 1969 and 1971 both manuscripts (Kassel GHB MS Theol. 31 2° and Theol. 44 2°) were completely rebound and any original evidence lost (letter of Dr Konrad Wiedemann, 30 April 1993).
9. For ÖNB Cod. 484 (s. ix) a possible origin from eastern France was suggested by Bischoff (Kattermann 1939 note 12); according to Dr Eva Irblich (her letter of 26 November 1991), Germany or northern Italy seem equally feasible. In SG Cod. 146 (s. ix/x) the attachment is only partly accessible; it is a blind-tooled binding and as such alien to St Gall, suggested to originate from France by Kyriss (1966).
10. This binding was kindly drawn to my attention by Dr Eva Irblich.
11. Although only a few fibres are required for the drying-twist test, it is essentially a destructive method. Whether or not the taking of samples for scientific inquiry of this nature is permissible, was thoroughly discussed with Prof. P. Ochsenbein, Librarian of St Gall Stiftsbibliothek. We agreed that, in principle, such procedures are not allowed, but that our ignorance on the matters of the nature of sewing threads would justify an exception to be made. It was decided that only a limited number of samples would be taken, obviously from broken and loose pieces of thread. This precluded applying statistically sound methods of random sampling. I owe thanks to Mrs J. Hofenk-de Graaff who made me familiar with the basic methodology of textile analysis and allowed me access to the facilities of the Netherlands Institute for Cultural Heritage in Amsterdam.
12. Data from her unpublished dissertation kindly provided by Dr Irmhild Schäfer.
13. The earliest evidence so far for the drawknife as a binder's tool in the Western world occurs in an inventory dating from 1383 in Brussels (Verheyden 1936–7); described as '*unus cultellus dictus houmes*', (modern *houzmes*), a Flemish term for the knife used by coopers and wheelwrights, thus very likely a double-handled drawknife. The two similar tools for woodworking and book trimming are itemized in the 1483 inventory of Michelsberg monastery in Bamberg: '*Duos cultros scindibiles ad libros. Unum cultrum scindibilem ad ligna*'; in a later version: '*II schnitmesser zu büchern. III schnitmesser zu holtz*' (Bresslau 1896; Lehmann 1929–30; Helwig 1941). Later inventories of binderies in Germany date from the sixteenth century, when the binder's plough had already come into use, and often mention both tools together; for example in a 1578 inventory from Leipzig listing '*2 Beschneide Hoffell*' (two ploughs) and '*3 Schnidmesser*' (three cutting knives; Lüers 1937).

Middleton (1963 p. 245) quotes a 1545 inventory from Cambridge, which lists (in sequence) '*Item a plowghe ij s*' and '*Item a cuttyng Knyff xx d*', possibly evidence for two different tools for edge trimming.

14. Fancy explanations as to the function of tabs started with Christ (1937 p. 30): '*Die überstehenden Rückenlappen erleichtern das Anfassen der Handschriften und das Herausnehmen aus den Repositorien*', and were adopted by Pollard (1962 p. 1): 'These tabs were perhaps used to pull out individual volumes packed fore-edge downwards in a chest'. Kattermann (1939 p. 19) considered the tabs '*eine sehr kluge Maßnahme der Sicherung gegen Staub und Ungeziefer*'. It is astonishing that scholars continue to reiterate the idea of books – often weighing several kilograms – being pulled by their tabs out of the chests without any sign of concern about the damage inflicted by such abuse.
15. A sample of the white powder from the surface of the tab lining shown in Figure 7.27 gave a positive reaction for starch with the iodine test.
16. Usually the grain surface of finished leather retains the unevenness of the papillary layer and the pattern of the hair follicles, which allow identification of the animal species. This holds for modern domestic animals like calf, pig, goat or wool sheep, but not for the many varieties of hair sheep (see Chapter 1, note 4). The method will fail on leathers which have their grain surface abraded during manufacturing, as in the case of oil-tanned chamois leathers; extensive use can cause chafing of the surface of the covering and reduce the grain beyond recognition. There is hardly any reference material to aid the identification of the grain of skins from the various wild or domestic animal species used for book covering in medieval times.
17. Treasure covers are the work of craftsmen other than bookbinders and shall not be further considered. Descriptions and illustrations can be found, among others, in Loubier (1926), Miner (1957), Geldner (1958), Steenbock (1965), Needham (1979), Duft & Schnyder (1984) and Laffitte & Goupil (1991). These works – except for Needham, and Duft and Schneider – do not provide details of binding structures, which in most cases had already been modified by repeated repairing or rebinding.
18. Kindly drawn to my attention by Michael Gullick.
19. The analysis of the mechanics of the spine is one of the most neglected subjects in bookbinding literature. No systematic studies are available, but valuable bits of relevant facts and many inspiring thoughts can be gathered in papers of Gurbat (1929; 1935), Clarkson (1978b; 1996b), Pickwoad (1983), Powell (1974), and Frost (1996); an excellent outline of the basic principles of the spine movement, primarily concerned with paper books, was presented by Conroy (1987).
20. Detection of resewing is notoriously difficult, since very often the earlier sewing holes were reused. In parchment, sewing holes will endure several resewings without any evidence; imprints of old threads may offer a clue. The categoric statement of Pollard (1962 p. 20) that 'If there is no series of regular [unused] holes in the hinge from an earlier sewing, then the book has never been resewn', is a dangerous fallacy.

Chapter 8 Romanesque bindings

8.1 INTRODUCTION OF THE SEWING FRAME

The evolution of binding techniques during the Middle Ages took place very gradually, and it is difficult to pin down the appearance of distinctive traits as landmarks for establishing successive typological entities. Often changes of various structural features did not keep pace: for example, the herringbone sewing of the carolingian binding remained in use for centuries, whereas the span type of change-over or the unsupported endband sewing seem to have had disappeared by the eleventh century. We are largely ignorant of the reasons why certain workshop practices were abandoned and others introduced; occasionally they can be recognized as a sequel of technical innovations.

Such an innovation was probably the introduction of the sewing frame, first documented in an illumination showing various stages of book production in a twelfth-century manuscript from the monastery of Michelsberg in Bamberg (Figure 8.1). Since its first publication by Loubier (1908–9) it has been reproduced many times and has given rise to some discussion about its exact time of introduction and how sewing on supports was carried out before its invention.[1] It is obvious that suspending the sewing supports on the frame allows the sewing of the bookblock before board attachment, in contrast to the practice of the carolingian binder who anchored the sewing supports to the upper board before starting to sew. A consequence of the new method was the identical mode of attachment of the slips of the sewing supports to either board.

8.2 EARLY LITERATURE AND RECENT STUDIES

The mode of board attachment is one of the most distinct technical characteristics of romanesque bindings, yet the term was not originally introduced on the basis of structural but of decorative features. It was G.D. Hobson (1929 p. 2) who proposed to call blind-tooled bindings of the twelfth and thirteenth centuries 'Romanesque'. At first they were thought to be English work, but studies by, among others, Haseloff (1924), Birkenmajer (1925; 1927), Gottlieb (1926), Husung (1929–30; 1933–9), Schilling (1929 30) and Mazal (1970b) convincingly showed that many of these bindings had originated on the Continent. G.D. Hobson (1935; 1939) listed 106 decorated bindings, most of them undoubtedly made in France. De Hamel (1984; 1986) pointed out that the majority of them contain glossed Bible texts, apparently mass-produced in twelfth-century Paris, from where they found their way to England and the rest of the Continent, soon to be imitated

Figure 8.1 The earliest representation of a sewing frame in the Ambrosius manuscript (Bamberg SB Msc. Patr. 5, s. xii²).

by local binders. The latest census is by Schmidt-Künsemüller (1985) who briefly describes and illustrates 139 decorated romanesque bindings.

The above studies paid attention to the decoration only, except for Birkenmajer (1925) who also provided technical details of three romanesque bindings of French origin. The very first and meticulous report on the structure of a twelfth-century binding with romanesque board attachment, herringbone sewing and a tab endband was provided by von Essenwein (1889 p. 9), but it remained unnoticed.[2] Van Regemorter (1951) briefly described the main traits of romanesque bindings from the Cistercian monastery of Clairmarais (now St. Omer BM).[3] We owe a detailed study of 'The Construction of English Twelfth-Century Bindings' to Pollard (1962), who examined about 50 examples, mainly from Oxford collections. Despite some blemishes, inevitable in pioneering work, this study, as well as his 1976 paper on 'Describing Medieval Bookbindings', represent milestones for scholarly research of binding structures. Vezin (1974) studied some 20 bindings at Angers BM originating from Saint-Aubin and Saint-Serge, and found evidence that the carolingian method of sewing and board attachment had been replaced by the romanesque practice by the end of the eleventh century. A few romanesque bindings at Wolfenbüttel HAB have been studied by D.-E. Petersen (1975); 60 bindings from various monasteries in Saxony (now Leipzig UB) were surveyed by Säuberlich (1979), with emphasis on the sewing and the endbands. Gilissen (1983) gave details of eight romanesque bindings in Brussels BR, mostly from northern France; two bindings in The Hague KB, probably of the

same origin, were described by Storm van Leeuwen (1983; 1989). Carvin's study (1988) of late medieval bindings in collections in southern France lists 16 examples, mostly of Italian origin, which can be classified as romanesque. A collection of about 80 romanesque bindings from the Cistercian abbey of Alcobaça (now at Lisbon BN) has been described, with the main accent on the mode of board attachment (Nascimento and Diogo 1984; Nascimento 1985; 1989). Finally, some recent work has been published on English material: Gullick (1993) briefly reviewed the main traits of some 60 romanesque bindings at Hereford Cathedral Library, Clarkson (1993) summarized the main features of English twelfth-century bindings and clarified structural details in Pollard's earlier studies (Clarkson 1996a; 1996b). Gamper (1994) provided extensive data on romanesque bindings of Schaffhausen StB; Sheppard (1995) reported details of nine romanesque bindings from Buildwas Abbey.

The following description of the romanesque binding structure amalgamates the salient details from the above publications. The main base is formed by my own studies of 110 romanesque bindings in Continental and English collections.[4] Unfortunately, some are of unknown origin and far too few examples originate from the same location (the two largest homogeneous groups comprise 16 bindings from the Benedictine abbey of Bury St Edmunds and 10 from the Benedictine abbey St Salvator of Schaffhausen). The majority (61) is English work, 28 bindings are from the German-speaking area, 15 are of French origin, four come from Spain and two from the Low Countries. The dates of the manuscripts range from the second half of the eleventh to the end of the fourteenth centuries; the sample has been divided into an 'early' and a 'late' group, with the year 1175 as borderline (early bindings: 55, late bindings: 48, with the exclusion of seven rebound carolingian manuscripts). It is assumed that a manuscript and its binding are of contemporary date, unless indicated otherwise.

8.3 BOOKBLOCK AND SEWING STATIONS

When examining the centrefolds of the quires one encounters quire tackets which served to keep the manuscript leaves together before they came to the binder. Out of the 110 bindings examined these were observed in 12 cases, usually consisting of rolled parchment, traversing the fold through holes *c.* 5 to 20 mm apart and secured by twining; in one instance the knotted tacket was of blue thread (HAB Cod. Guelf. 506 Helmst.). These findings agree with earlier reports: Gilissen (1983 p. 134) noted tacket holes in Brussels BR MS 8380–9012 (from Saint-Bertin), Gimbrère and Obbema (1985) described parchment tackets in an Italian manuscript dating from 1150–1200 (Leiden UB d'Abl. 1). Gullick (1996) reviewed the literary and physical evidence for primary quire tacketing in twelfth-century European bindings and found over 40 instances of surviving tackets or of redundant tacket holes; further examples are given by Vezin (1997).

The holes for the bookblock sewing are either round, pierced with an awl or the sewing needle itself, or they are slits of up to 6 mm, cut by a knife or chisel (see Figure 7.14). The distances of the slits between corresponding stations are so exactly identical in

the neighbouring quires that they must have been cut prior to sewing, probably while the quires were held together in a press. In the case of pierced holes there is more irregularity; this also holds for the pierced holes of the endband sewing. In a number of bindings the stations appear to have been 'marked up' prior to sewing with small pricks a few millimetres from the fold (Figure 8.2); they usually traverse all the leaves of the quire. This mode of marking up the sewing stations was very likely meant as a guide for the binder, either to pierce the holes separately in each quire before sewing or during the sewing operation itself.

Such marking pricks have been found on carolingian bindings (see section 7.4). They were observed on twelfth-century manuscripts by Powell (1965 p. 262); Gilissen (1983 p. 91, pl. LI and p. 137, pl. LIX) noticed them in two cases (Brussels BR MS 1917, s. xii, and MS II 946, s. xiii). Other early examples are in the two Domesday books (Gullick 1987; Forde 1987). Załuska (1989 p. 55) noticed the regular occurrence of marking up in twelfth-century manuscripts of the Abbey of Citeaux. Gullick (1993; 1996) carefully recorded the phenomenon in English romanesque bindings, and found that occasionally orange or green crayon was used to mark the sewing stations; he estimated that 10 to 20 per cent of English bindings of this period show signs of marking up. Other observations have been reported by Clarkson (1996b) and by Sheppard (1995), also in bindings of English origin.

Analysis of my own material suggests that the marking up of sewing stations and the occurrence of pierced holes are less frequent on the Continent. Although the number of observations is limited to 79 bindings, geographical differences appear evident: all but one (BL Henry Davis Gift M 49; Fountains Abbey, s. xii; see also Foot 1983 p.25) of 48 bindings in English collections have pierced holes, compared to 23 out of 31 in Continental examples which have slits; the remaining eight with pierced holes come from France (6),

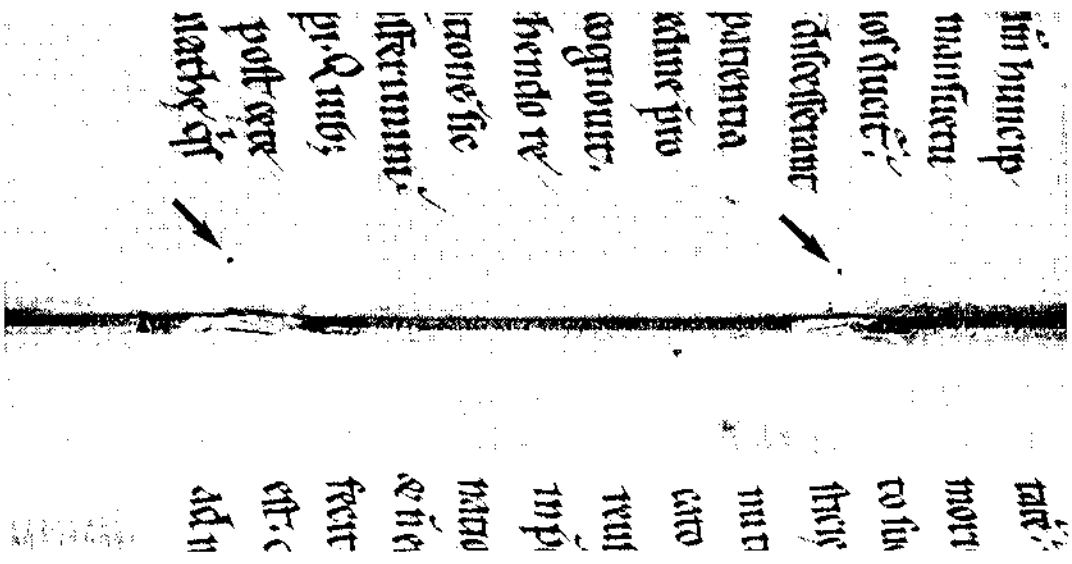

Figure 8.2 Marking up the sewing stations with tiny pricks (see arrows); The Hague KB 78 D 45, s. xii, pp. 58–9.

Table 8.1 Number of sewing supports in 210 romanesque bindings from different geographic regions. Data taken from my own survey (90) and from the corpus of Schmidt-Künsemüller (1985; 120 cases)

	Number of sewing supports					*Total of*
	2	*3*	*4*	*5*	*6*	*bindings*
France	24	39	19	5	5	92
England	26	22	13	4	4	69
Germany*	1	38	5	1	1	46
Spain	1	–	1	–	–	2
Italy	–	1	–	–	–	1
Total	52	100	38	10	10	210

* Germany includes Austria and Switzerland.

Spain (1) and the Low Countries (1). The predominance of pierced sewing holes in the English material is highly significant (chi-square test, $\chi = 46.3$).

There seems to be no correlation between the number of sewing supports and the height of the spine, which ranges from *c.* 180 to 390 mm (mean = 286.1; *s.d.* = 61.5). Often quite large volumes have only two supports, with wide inter-station distances of over 100 mm. Table 8.1 shows that there are geographical differences in the number of sewing supports, namely the relative scarcity of bindings with two sewing supports in Germany, in contrast to the English and French material. I also observed some chronological differences, namely the occurrence of two supports in earlier periods, notably in France, and a general tendency of higher numbers prevailing after 1200. This agrees with the observations of Pollard (1975 p. 56) who suggested emphatically that 'the number of thongs increases from about 1250 until about 1400 when it begins to decline'. In general, the main sewing stations are equidistantly spaced; in terms of percentages of the spine height the inter-station distances are, for the groups with two, three and four supports 33.4, 25.8 and 21.7 per cent respectively. In other words, the binder would divide the spine height into three, four or five approximately equal segments to set the main sewing stations.

Approximately indeed, since the outer segments, that is, the distance between the outermost main sewing stations and the head and tail edge, show deviations from the inter-station distances. Figure 8.3 shows the mean values of these differences calculated for the groups with two and three supports. Both groups have similar patterns: the outer segments can be either markedly shorter (by some 20 per cent) than the mean inter-station distance, [a] and [e]; or they can be longer in the same percentage range, [d] and [h]. But a majority of bindings, whether with two or three supports, displays only a minor deviation, negative or positive, [b] and [f], and [c] and [g], in absolute terms amounting to *c.* 2–6 mm. The sample size is too small to warrant general conclusions, but the results suggest that such patterns could be characteristic for a given workshop. Nine of the 10 bindings from

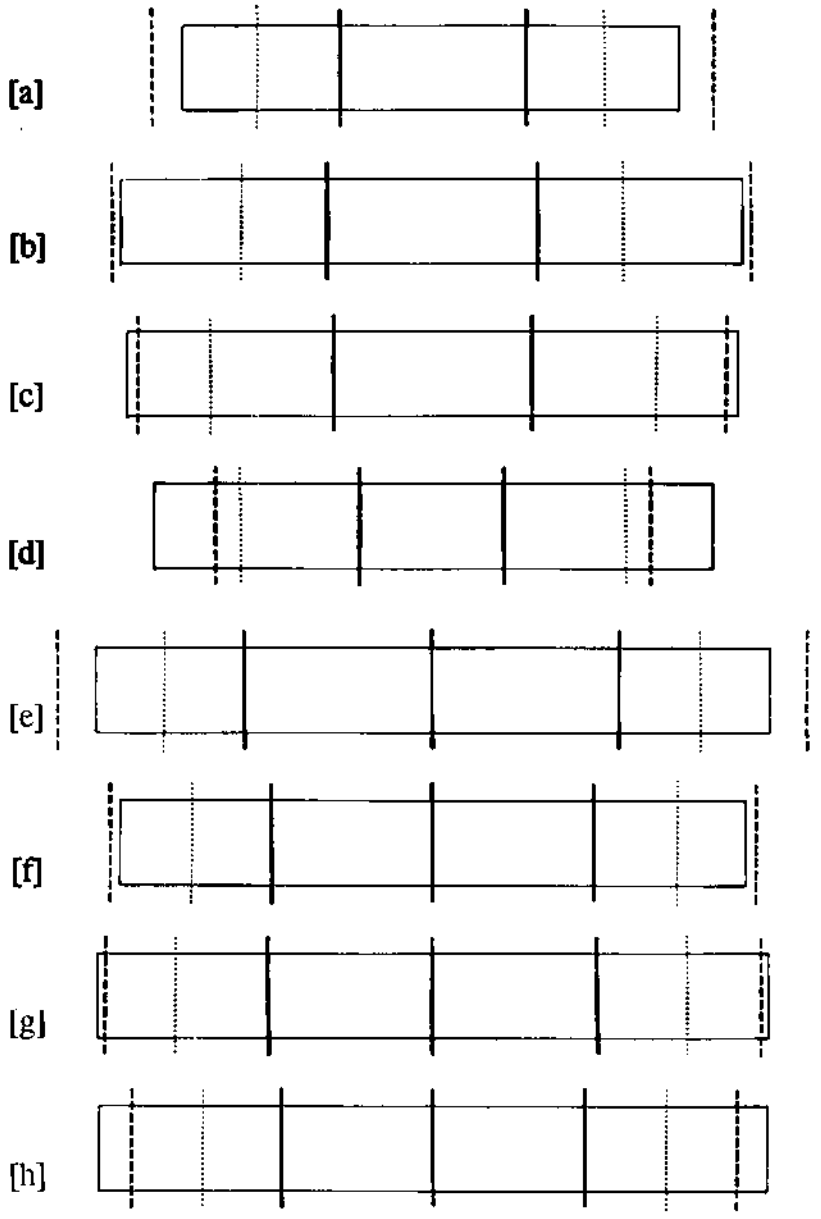

Figure 8.3 Disposition of the sewing stations on 66 romanesque bindings. The heavy vertical lines show the actual sewing stations, the heavy broken lines represent the next theoretical equidistant spacing; the dotted lines indicate the change-over stations. The distances are mean values of the following numbers: [a] 5, [b] 6, [c] 8, [d] 7, [e] 12, [f] 14, [g] 12, [h] 2.

Schaffhausen St Salvator monastery, active between *c.* 1080 and 1150, have patterns [b] and [c], indicating a rather uniform practice. The finding that the spacing of the sewing stations can be characteristic for a given workshop was already apparent with some carolingian bindings (see Figure 7.13). Sheppard (1995) utilized the spacing pattern to ascribe a number of twelfth-century bindings to Buildwas Abbey.

Whereas the patterns in Figure 8.3 are the most usual ones in romanesque bindings, various other spacings have been observed. In one of the bindings described by Gilissen (1983 p. 102ff., pl. LVII; Brussels BR MS 2411, s. xiii, origin unknown) the three supports are spaced 102 mm apart, but the distance of the outermost stations to the edge is no more than 17 mm (endband sewing: 5 mm); similar is the spacing in BL Henry Davis Gift M 49, where the outermost stations are situated at about 12 mm from the edges. The disposition of the stations is also different in bindings with 'single-station sewing' (see below) and with a simultaneously-sewn endbands system ('integral sewing', see note 8).

8.4 ENDLEAVES

Two thirds of the 110 romanesque bindings I have studied led to the conclusion that it was established practice to paste down the endleaves (always made of parchment) after covering; only in a single instance was the pastedown under the turn-ins. This was a rebound ninth-century manuscript with reused boards, attached through the original carolingian lacing paths but with plugs in either board, combining both carolingian and romanesque traits (SG Cod. 175; see Figure 8.19). The remaining third had their endleaves cut out and pastedowns removed, to be replaced by new endleaves, usually of paper.

It could be assumed that the endleaves of 67 bindings were probably original. Since the upper and lower endleaves were identical in only half of the bindings, the endleaves have been considered separately for the two covers. Figure 8.4 summarizes the findings of the data of 134 covers and shows that there are four main categories: [a], no endleaves; [b] and [c], modifications of the first or last quire to serve as pastedown; [d] to [g], the addition of a separately sewn endleaf quire, varying in this case from one or two bifolia to a stubbed leaf used as pastedown. Finally, there is the special construction of conjoint pastedowns [h], a double leaf slotted over the sewing supports and across the spine (see Clarkson 1993 fig. 10). This construction was obviously made before the boards were attached, as is evident in Hereford MS O.5.4 and O.8.3; similarly, this type of endleaf may consist of two separate leaves, slotted over the supports and overlapping on the spine (Oxford Jesus College MS 65, s. xii, from Gloucester).

The combinations of construction types chosen for the endleaves for a given binding can obviously vary: the combination of type [d] for the upper endleaf and type [c] for the lower endleaf was found in 10 bindings; in four bindings type [e] for the upper endleaf was combined with [b] or [e] for the lower endleaf. I gained the impression that constructions [d] and [e] occurred predominantly in bindings of a later date (thirteenth and fourteenth century), but the sample is too small to allow definite conclusions. The majority

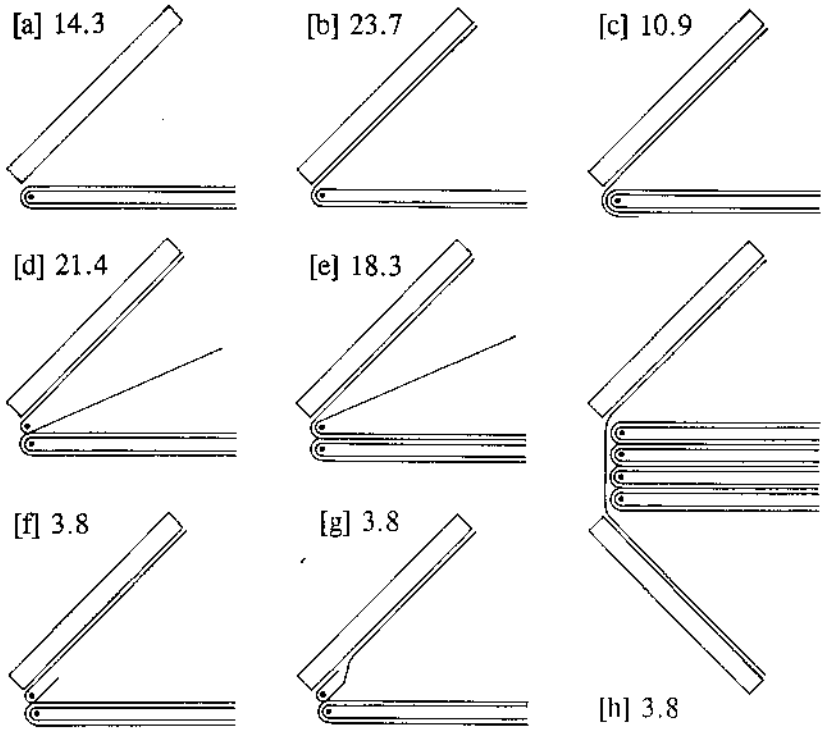

Figure 8.4 Endleaf constructions on romanesque bindings. The numbers represent percentages on a total of 134 endleaves (for details see text).

of the original endleaves was made of blank parchment; in four cases a manuscript leaf was used as pastedown, hooked around the first and last quire (Figure 8.4[c]). Although the use of reject manuscripts for endleaves seems to have become general practice only in the fifteenth century, the few instances found in romanesque bindings could be considered as genuine precursors. Such is probably the case with Cracow, Biblioteka Jagellońska MS 2470 (s. xii, from France), the pastedown of which is an unfinished Lucanus fragment, written by the same hand as the text (Birkenmajer 1925). Similar instances are Leiden UB VLF 42 (s. xiii) and Lipsius 30 (s. xi), with fragments originating from the same scriptorium as the manuscript.[5]

8.5 SEWING

The sewing supports of romanesque bindings consist almost invariably of thongs of whittawed leather;[6] they are often up to 5 mm thick, between 8 and 20 mm wide and split longitudinally across the spine. Out of 94 cases with accessible supports, 89 are of this slit-thong type (two are rebindings using double cords, one is sewn on double rolled thongs

and two on single thongs employed for 'single-station sewing', as described below). The grain surface of the leather thongs is seldom exposed, but a few exceptions suggest deer or oxen as the most likely animal source. Sometimes evidence can be found that the thongs had been suspended on the sewing frame, namely short (up to 10 mm) slits or round holes, occasionally with traces of iron rust. Such slits (*'boutonnières'*) were described by Gilissen (1983 p. 40, pl.IX and X). The slits in the thongs across the spine begin close to the spine edge of the upper board (where sewing usually begins), but often continue 10 to 30 mm further into the slip entering the lower board.

About two thirds of the 110 romanesque bindings studied had herringbone sewing, almost exclusively a characteristic of carolingian bindings (Figure 8.5[a]). Straight sewing that omits the linking with the previously sewn quire and shows turns perpendicular to the support, is present in about one quarter of the bindings studied; in a few instances it is of the 'packed' type, [b] and [c].[7] In six out of the 110 bindings studied single-station sewing was found (see below). Although not evident in this sample, mention should be made of the 'knot sewing', a variant of the straight sewing and described in twelfth- to fifteenth-century bindings from Upper Austria (Klee 1978); it involves making a link with the loop made around the first half of the support, before re-entering the quire.

In all bindings studied the change-over is of the link-stitch type; in no instance was a simple span observed as in the earlier period (see section 7.4, Figure 7.16). Omission of the 'kettle stitch' (i.e. change-over of the link-stitch type) in romanesque bindings was noticed by Pollard (1962), yet the notion is ambiguous since it may concern different structures. One of Pollard's examples, Cambridge Trinity College MS O.3.22, is probably an instance of 'integral sewing' (see below);[8] the other, Bodley Bodl. 672 (from Chester, s. xii^{ex}), has 'single-station sewing' where evidently the usual change-over stations are absent.

Single-station sewing was first observed as a seemingly odd rarity on Oxford Jesus College MS 3 by Pollard (1962). He interpreted it as a 'curious mistake' of a binder who had sewn the book 'inside out', that is, making short stitches opposite the supports in the centrefolds and running the thread from one support to another on the outside of the quires. This supposition was a mistake: the sewing stations are not interconnected, neither

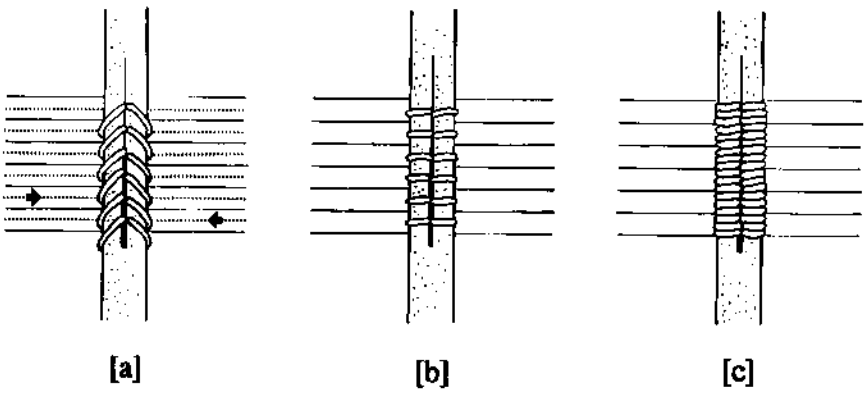

Figure 8.5 The main types of sewing on slit-thong supports on romanesque bindings: [a], herringbone, [b], single straight sewing, [c], packed straight sewing.

inside nor outside; in fact, each support forms a separate structure, sewn independently with a separate needle and piece of thread. Further examples of such single-station sewings were observed in five out of 60 thirteenth-century bindings from Saxony by Säuberlich (1979; Leipzig UB MS 222, 268, 282, 304 and 353); designated as '*Bundeinzelheftung*' the sewing structure is also illustrated in Wächter's manual (1981 p. 159, fig. 100), without the unusual nature of this system being pointed out. It is carried out on single thongs; the thread forms a single stitch in the inner fold between two holes, opposite the edges of the thong; after exiting at one side, the thread returns to the penultimately sewn section, crosses obliquely over the thong, passes under the penultimately sewn section and climbs to enter the next quire at the other side of the thong, resulting in a sort of herringbone pattern ('*Fischgrätenmuster*') as can be seen in Figure 8.6A.

The list of bindings with single-station sewing was enlarged with Bodley Bodl. 371 and Laud. misc. 606, observed by Clarkson in the early 1980s (Clarkson 1996b); a number of others in Hereford CL (originating from the Abbey of Cirencester like the one first observed by Pollard) were identified by Gullick.[9] Another example is Cambridge UL Add. 4084 originating from the Benedictine abbey of Santo Domingo de Silos, Spain. The latter, as well as Bodley Laud. misc. 606 (from Cistercian abbey Bordersley) and Bodley Bodl. 672 (from Benedictine abbey Chester) have the same kind of single-thong sewing as in Säuberlich's German examples from Saxony; the other examples mentioned appear to have slit-thong supports with straight sewing, single or packed, the movement of the thread being probably as shown in Figure 8.6b. Several of the English examples represent resewn books which originally had the usual multi-station sewing structure.

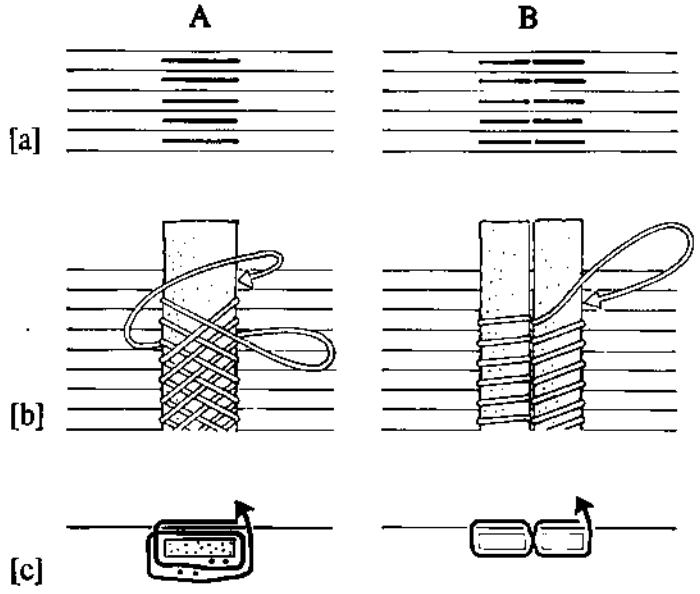

Figure 8.6 Two types of romanesque single-station sewings. A: single sewing support, B: double (split) sewing support. Shown is the fold pattern [a], the spine pattern [b], and the thread movement in cross-section [c]. The arrows indicate the point where the thread enters the next quire to be sewn.

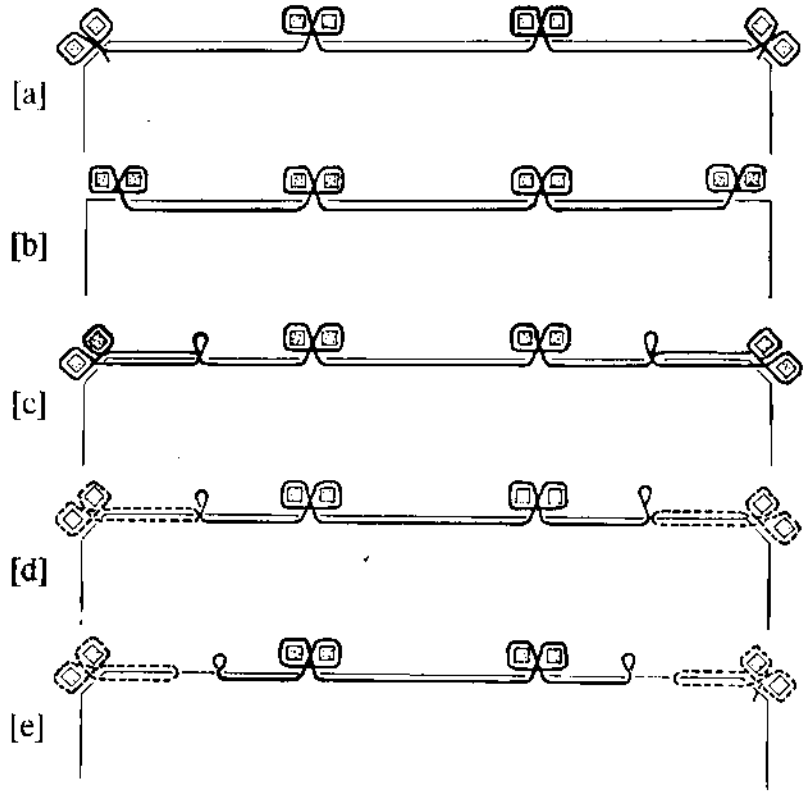

Figure 8.7 Various types of integral sewing [a] to [c]; for comparison, separate endband sewings (broken lines) are shown in [d] and [e].

Integral sewing involves shifting the outermost sewing stations to the head and tail edge where change-over takes place, while outermost supports serve as endband supports. There are several variants, depending on the position of the outermost stations (Figure 8.7[a] to [c]): they can be placed either immediately on the edge (which can be square or slanted, [a]), or very close to it, [b]. Bodley Bodl. 86 (from Windsor, s. xii) is an example of the latter, with its outermost stations set *c.* 3 to 5 mm from the head and tail edge, the two main supports as well as those of the endbands (slit-thong type) having packed straight sewing. Somewhat similar are Philadelphia Free Library MS Lewis 22 (s. xii^2, from Spain), with the outermost stations *c.* 10 mm from the edges (Gullick 1996), and BL Henry Davis Gift M 49 (s. xii/xiii, from Fountains Abbey), with outermost stations *c.* 12 to 15 mm from the edges. The endband sewing may be of the straight packed type (for details of integral endbands see Section 9.7) or of the herringbone type, provided an additional link is made as at the change-over stations of Armenian bindings (see Figure 6.20).

Although characteristically integral sewing lacks the link-stitch type of change-over, one must be alert to exceptions: Gilissen (1983 pp. 18–19, fig. 6) reported on several bindings with '*tranchefile à la couture*', a term he used to describe integral sewing with a link-

Table 8.2 Final twist of the sewing thread in 76 romanesque bindings

	S-twist	*Z-twist*	*Total*
Early group	13	27	40
Late group	22	14	36
Total	35	41	76

Table 8.3 Board material in 91 romanesque bindings

	England	*Continent*	*Total*
Oak	55	16	71
Beech	–	20	20
Total	55	36	91

stitch change-over at the penultimate stations (see Figure 8.7[c]). It requires close scrutiny to distinguish such structures from the more customary separate endband sewing, especially if the latter is tied down at the change-over station and the thread is identical (Figure 8.7[d] and [e]). It should be pointed out that integral sewing is rather rare in romanesque bindings and is more frequently encountered in gothic bindings (see section 9.4).

There is little information about the sewing thread of romanesque bindings. I have measured the diameter of the sewing thread in 76 cases; it had a mean value of 0.91 mm (*s.d.* 0.17), slightly larger than the 0.78 mm found in carolingian bindings. The data in Table 8.2 demonstrate that final Z-twist occurs significantly more often in the early group (chi-square test, $\chi = 6.2$; cf. Table 7.2). Most threads with S-twist are single-plied (composed from one to eight Z-spun yarns), those with Z-twist are virtually all re-plied, with two to four Z-spun units in various combinations (Z-2s-2z, Z-2s-4z, Z-2s-5z, Z-3s-2z, Z-3s-3z, etc. and even a twice re-plied example of Z-5s-2z-2s). The sewing thread in most of the Buildwas bindings had Z-twist, while one that certainly was resewn later showed S-twist (Sheppard 1995).

8.6 BOARDS AND BOARD ATTACHMENT

Wooden boards are a regular feature: in the sample of 110 bindings the material could not be identified in 19 cases, while in the remaining 91 the majority were of oak. As Table 8.3 shows, all English bindings have oak boards.[10] This finding agrees with Pollard (1962; 1976), who found oak typical for English bindings and considered other species (beech, lime, chestnut, maple) as likely to be of foreign origin. Data in the literature as well as my own observations are too limited to allow conclusions as to a possible geographical prevalence of the wood species on the Continent; yet it may be of some significance that all 10 bindings from Schaffhausen have boards of beech. All but two of the 91 pairs of boards were quarter cut. The thickness of boards (leather covering included) was measured in 93 bindings; the values at the fore-edge were sometimes slightly less than at the spine. The mean value is 10.9 mm (*s.d.* 2.4), but the histogram (Figure 8.8) shows two peaks, similar to the observations on carolingian bindings (cf. Figure 7.3). The profiles of the spine edge in 51 out of 89 cases observed are square, 30 are slightly bevelled, eight have a slightly

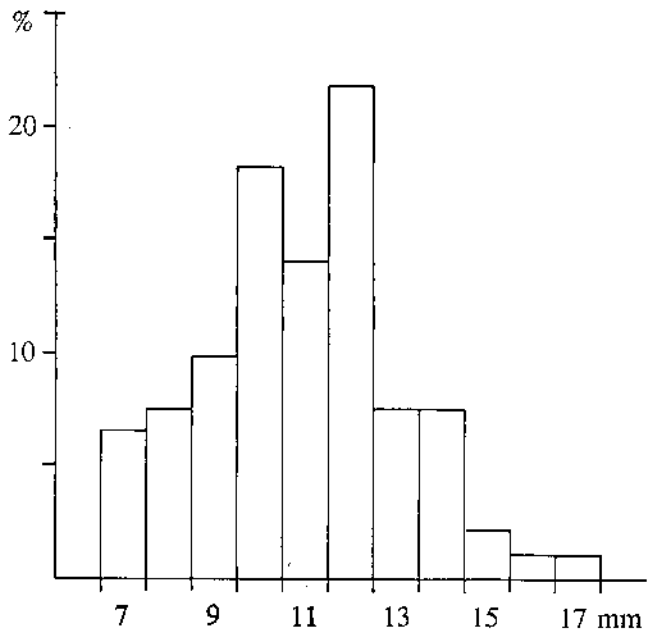

Figure 8.8 Histogram of the board thickness measured on 93 romanesque bindings.

rounded profile. The free edges of the majority of the boards (Figure 8.9) are usually square, A, or they have a slight bevel, B and C; in about one fifth, mostly in the late group, the free edges are rounded, D, or cushioned, E and F.

Although wood is the material of choice for the boards of romanesque bindings, in some cases a rigid core was made of other materials: De Hamel (1984 p. 69) lists seven instances, from both England and the Continent, where hide was used. Adam (1917–18) found several layers of an old blind-tooled leather covering as board material in the binding of one of the copies of the Golden Bull of Charles VI, dating from about 1356. Parchment leaves from a Sacramentary (s. x) were reused to make up the stiff boards for the Winton Domesday book bound around 1150 (Nixon 1976).

* * *

A distinctive feature of the romanesque board attachment is that the slips of the thong supports enter the board through tunnels cut into the spine edge. Some early observations on several variants of such attachments have been recorded by von Essenwein (1889), Adam (1916b; 1923b), Birkenmajer (1925; 1927), Fink (1939) and van Regemorter (1951). The studies by Pollard (1962), intended to elucidate the lacing path, turned out to be rather misleading because of his erroneous interpretation of the radiographs; however, they brought to light that boards had often been reused, as evidenced by details of earlier (usually carolingian) attachments. The observations by Vezin (1974) on the earliest romanesque attachments from the late eleventh century and his clear diagrams of the main

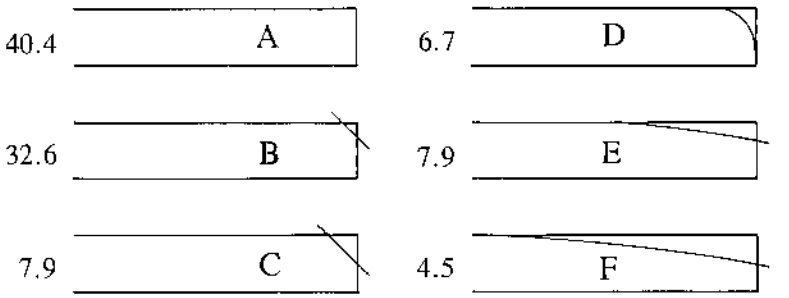

Figure 8.9 Profiles of the free board edges as recorded on 89 romanesque bindings. A: square, B: flat bevel less than one-third of the edge thickness; C: flat bevel half edge thickness or more; D: rounded edge; E and F: narrow or broad cushioned profile (numbers represent percentages).

type of lacing path have often been reproduced in other studies (Vezin 1978; 1981; Bozzacchi 1980; 1985; Gilissen 1983). Some confusion arose about variants of romanesque attachments observed in bindings from the Cistercian abbey of Alcobaça (Nascimento and Diogo 1984; Nascimento 1985; 1989; Gilissen 1983; 1985; Carvin 1988), as various authors failed in their diagrams to clearly indicate the outer and inner face of the boards. Ambiguities in the earlier work of Pollard (1962; 1975), resulting from limitations of the X-ray technique, were clarified in a careful reinvestigation of his material by Clarkson (1996a).

The above data and my own observations on the lacing paths of 91 bindings

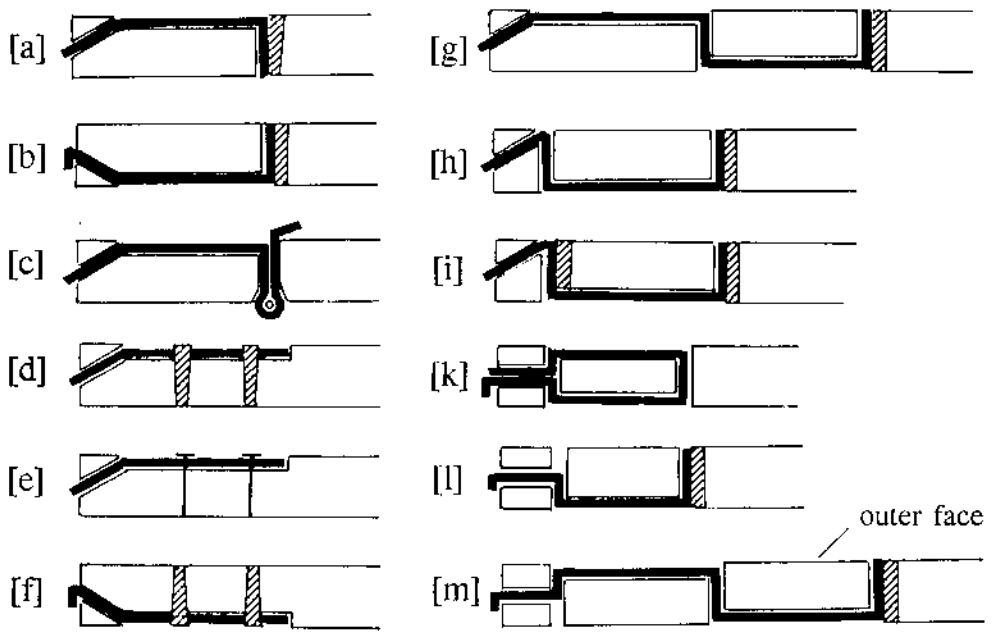

Figure 8.10 Various types of romanesque board attachments (for details see text).

studied have revealed two main types of romanesque board attachment and a considerable number of variants, illustrated in Figure 8.10. Generally, the short (10 to 15 mm) entrance tunnel, as a rule rectangular but sometimes round, runs from the spine edge obliquely towards the outer face of the board where it surfaces and continues to travel in a channel of *c.* 25 to 50 mm in length; this channel terminates in a transversal hole where the end of the slip is fastened with a wooden wedge or peg [a]. I found this type, termed 'short lacing path' by Clarkson (1993), in 15 out of 91 instances, virtually all on English bindings. In the second most frequently occurring type, the 'long lacing path', the slip traverses the board through the first hole, continues in a channel on the inner face for another 20 to 50 mm and is pegged in a second hole [g]; this type of lacing path I observed in 60 out of 91 cases, equally distributed between the English and Continental examples. The length of the path may extend up to the middle of the board (see Figure 8.12[c]). The entrance tunnel may also start parallel to the board surface and merge into the channel through a transversal hole as in [k], [l] and [m] of Figure 8.10, noted on Portuguese bindings from Alcobaça (Nascimento and Diogo 1984; Nascimento 1985; 1989); in the same material entrance tunnels exiting on the inner face of the board [b] and [f] were observed, which is a mechanically weaker construction but leaves the outer face intact. Instead of being fastened with a peg or wedge, the slips can be fixed with trenails [d] and [f] and Figure 8.11, or with iron nails (Figure 8.10[e]), the latter are often found on bindings of Italian origin (Carvin 1988). Finally, there are ways of folding the slips in such a manner that they themselves prevent

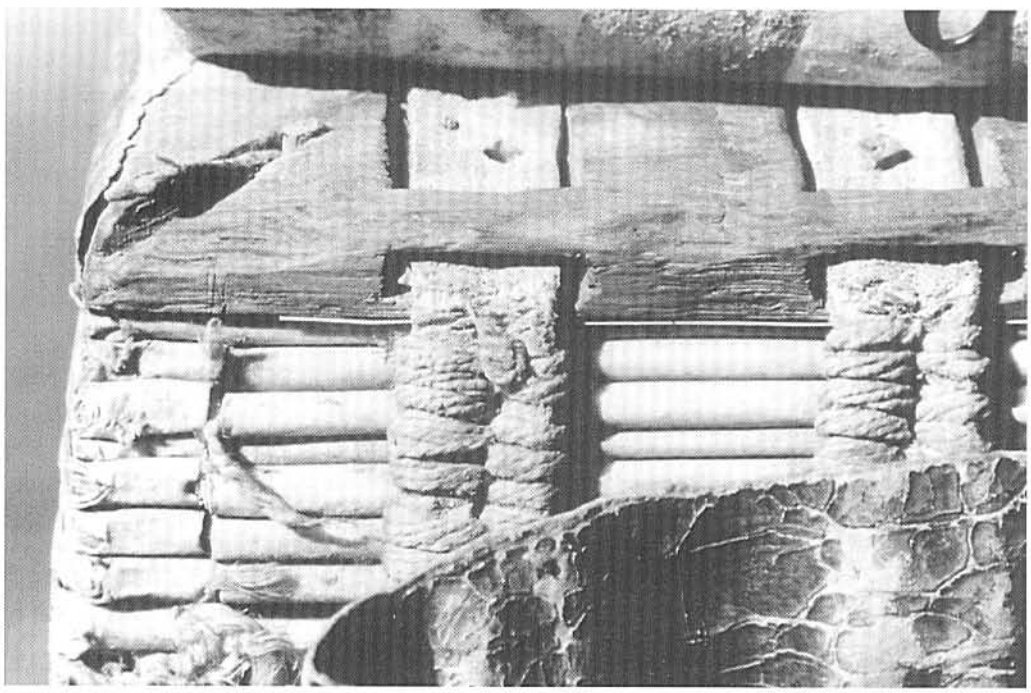

Figure 8.11 Board attachment with slips fastened with trenails (HAB Cod. Guelf. 506 Helmst., s. xiv; see also Figure 8.10[d]).

their slipping: [c] in Figure 8.10 is based on PML M 922 (from Catalonia, *c.* 1150; Needham 1979 p. 59) with a tiny parchment roll as blocking device; [k] occurs on bindings from Alcobaça (see above). Lacing paths of type [c] seem also to have been used on the '*biccherne*' of Sienna (Borgia et al. 1984).

Examples of the disposition of the lacing paths are shown in Figure 8.12. In the two most frequently found patterns, [a] and [b], the slips of the sewing supports follow an equidistant path; in order to decrease the risk of splitting the board, the transverse holes may be staggered, as often found with a larger number of supports [c]. Data are so far too scanty to attribute a given type of disposition pattern to a geographic region, time period or a specific workshop, but a few findings could hint at such correlations. For example, nine

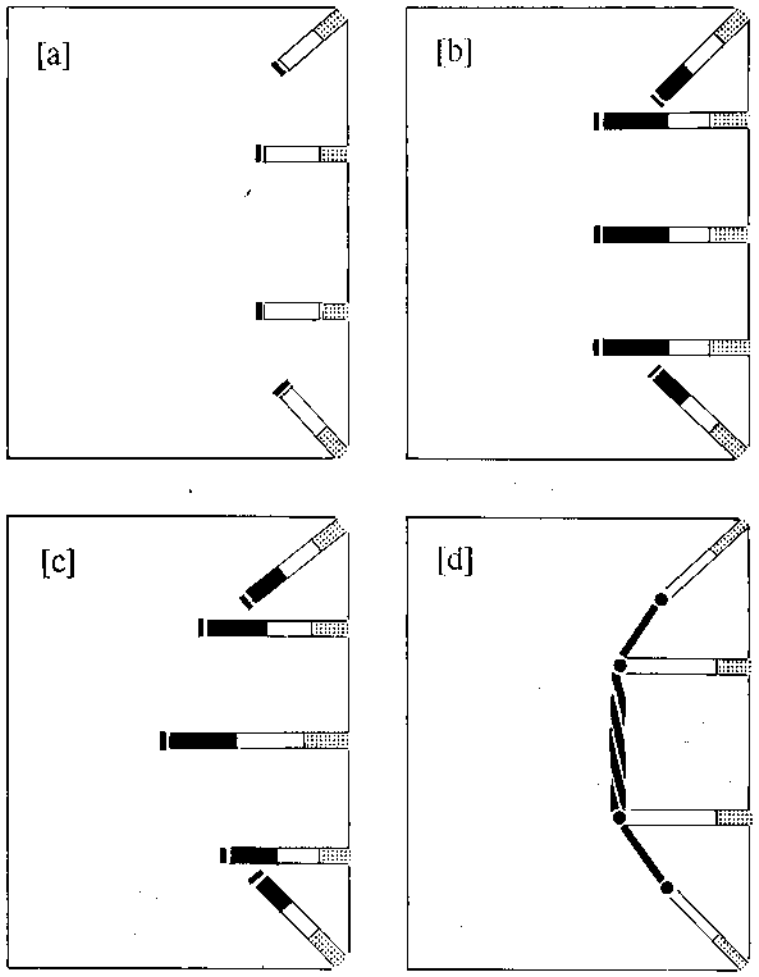

Figure 8.12 Disposition of the lacing paths on romanesque bindings. [a], short lacing path;, [b], long lacing path with holes equidistant from the spine edge; [c], long lacing path with staggered holes; [d], short lacing path, slips lodged in bow-shaped groove (after Bodley Laud. misc. 118, s. xii [?]). The course of the slips: shaded (in entrance tunnel); blank (outer face); black (inner face).

out of 10 Schaffhausen bindings have exactly the same pattern [b]; out of 16 bindings from Bury St Edmonds I found pattern [b] in 12 cases, all dating from the twelfth century, and pattern [a] in another four, all from the thirteenth century.

Of the less frequently encountered variants of dispositions of the lacing path in romanesque bindings, only one is included in Figure 8.12 [d]: here the slips are interconnected and are lodged in a semicircular groove. Pollard (1975 p. 151, nos. 9 and 10) noted this on BL Add. 34890, a reused board, and on Bodley Bodl. 229, which is probably a rebinding sewn on cords. An original example seems to be Bodley Laud. misc. 118 where the ends of double thongs are partly twisted and pegged together with the single endband supports.

The sometimes quite extensive and exacting carpentry work of making the lacing paths is, as a rule, completed with taking off the corners of the spine edge of the boards ('back cornering'). Usually a corresponding part of the bookblock is also cut away to form a slant, accommodating the endbands to prevent them from protruding too far over the head and tail edge (Figure 8.13). Back cornering of the boards and slanting of the bookblock appear for the first time with romanesque bindings; I have not seen them on carolingian bindings. The tunnels for the endband support enter through the cut-off corner of the boards and follow a path analogous to that of the main supports, but they are often shorter; usually the angle to the spine edge is about 45°, but this may vary considerably.

Figure 8.13 Back cornering of the board and slant on the bookblock to accommodate the endband support (HAB Cod. Guelf. 4.10.4°, s. xii).

8.7 EDGE TRIMMING

Assuming that the bookblock had been sewn on the sewing frame, the next step would be to attach the boards and proceed with the trimming, drawing the knife along the edges of the boards as was practised with carolingian bindings (see section 7.6, Figures 7.19 and 7.20). That the binder would follow this scheme is supported by the finding that the majority of romanesque bindings have no squares. In 79 of the 87 cases where exact measurements were taken, the difference between the height of the boards and that of the bookblock averaged 2.4 mm; this would mean squares of 1.2 mm, a difference accounted for by the thickness of the leather covering. Score marks of what was probably the drawknife were observed in about 30 per cent of the romanesque bindings studied. The majority of the edges was blank; decoration was very rare and was accompanied by other evidence of later interventions.[11]

In eight bindings the height of the covers exceeded that of the bookblock by values of between 8 and 15 mm. Here we are dealing with squares, which must be interpreted as evidence that trimming of the bookblock took place before attaching the boards. However, in at least six of these cases there is evidence of rebinding at a later date; the other two belong to the latest (fourteenth-century) romanesque bindings.

8.8 SPINE TREATMENT

Spine lining is another characteristic feature of romanesque bindings. In addition to tab linings, a basic element of the romanesque endband construction, the whole spine often received one or more layers of mostly chamois leather. I examined the linings in 79 out of the series of 110 bindings and observed a great number of variants (Figure 8.14). Tab linings only occur in 32 cases, usually extending to the outermost sewing supports and across the width of the spine. They may be attached by the endband sewing only [a]; they may be taken onto the edges of the boards where they are fixed with trenails [b], or they may even be taken onto the side of the boards where they are fixed through the lacing of the endband supports [c]. The endband tab may have a facing of colourful textile or stained leather [d]. The remainder of the spine may have patch linings between the sewing supports [e] which can extend onto the board edge and be fixed there by trenails or may even be cut large enough to be taken and pasted onto the inner face of the boards [h]. Tab linings may be integral with a single full-length spine lining [f], which may be as wide as the spine or extend onto the board edges and be fixed there with trenails; tab linings and a full-length spine lining can be combined [g], with or without additional patch linings. The most elaborate mode of lining was described by Birkenmajer (1925): it involves, in successive layers, a textile tab facing, a full-length spine lining extending over the inner face of the boards and tab linings fixed through the endband support [i]. Whereas leather is the prime material for spine lining, the use of parchment for patch linings was documented by Vezin (1984) on Bodley Bodl. 807 (s. xiii).

Although today virtually all romanesque bindings have a loose back covering, there

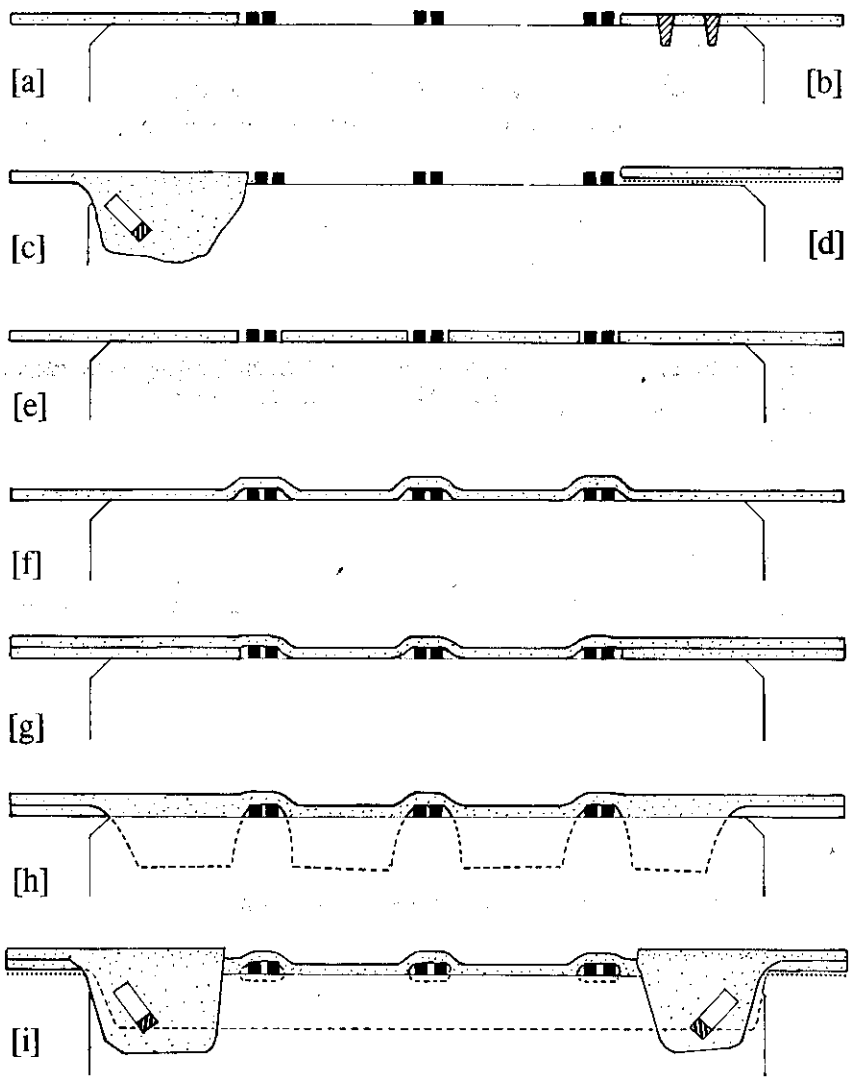

Figure 8.14 Variants of spine linings on romanesque bindings (for details see text).

are reasons to assume that originally the linings and back covering had been pasted onto the spine. It is unlikely that loose patch linings (for example, in BL Henry Davis Gift M 49) would never have been fixed; although endband sewing through an unfixed lining is feasible, it is carried out much more easily through a tab lining that has been affixed in place. I could observe residues of paste on patch linings or detached back coverings on several occasions, for example, the detached cover of Würzburg UB Mp.th.f. 89, and Hereford CL P.1.12 (Figure 8.15). These findings would be in line with similar observations on carolingian bindings (see Figure 7.27). There is no evidence for the use of animal glue to stabilize the spine or to attach linings on romanesque bindings. Pollard (1976 p. 52) was very likely

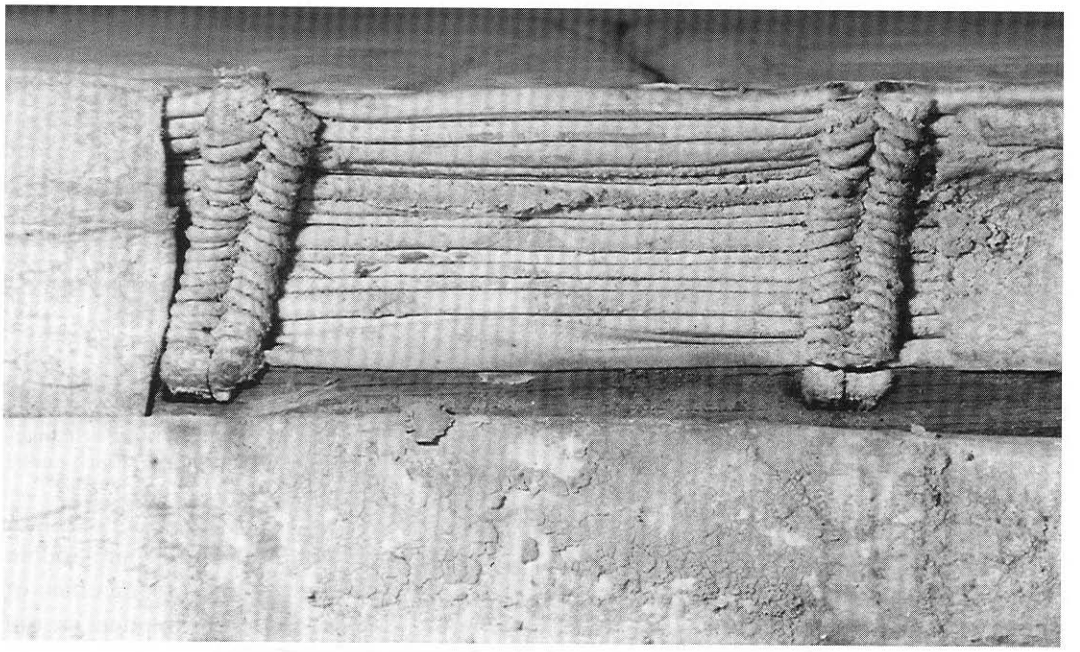

Figure 8.15 Traces of paste on the spine and on the leather covering (Hereford CL P.1.12, s. xii^{med}; from the Augustine abbey of Cirencester).

right in stating that 'glue was hardly used at all in binding during the Middle Ages'; yet his reference to an English manuscript from 1352 (San Marino, Huntington Library HM 132), as the earliest evidence of the use of glue, is incorrect: the binder's note specifying 'a half-penny for glue he used in the grooves and spine of the book', dates from a later period of rebinding (see Chapter 9, note 23).

8.9 ENDBANDS

Several types of endbands are encountered on romanesque bindings: (a), tab endbands with herringbone or straight sewing on double supports, similar to the carolingian type (see section 7.7, Figures 7.23 and 7.24), with a few decorative refinements like an increased use of coloured threads, facing of the tab lining with colourful textiles and more elaborate embroidery of the tab perimeter; (b), tab endbands with sewing on single supports, that is, wound primary endbands which could be left plain and (c), wound primary tab endbands which received a secondary endband sewing (embroidery) with coloured linen or silk thread, thus yielding a compound endband. The diagrams in Figure 8.16 illustrate the main construction principles.

In the series of 110 bindings studied, the type of endband sewing and the kind of support could be identified only in 81 cases (Table 8.4). Usually the endband supports

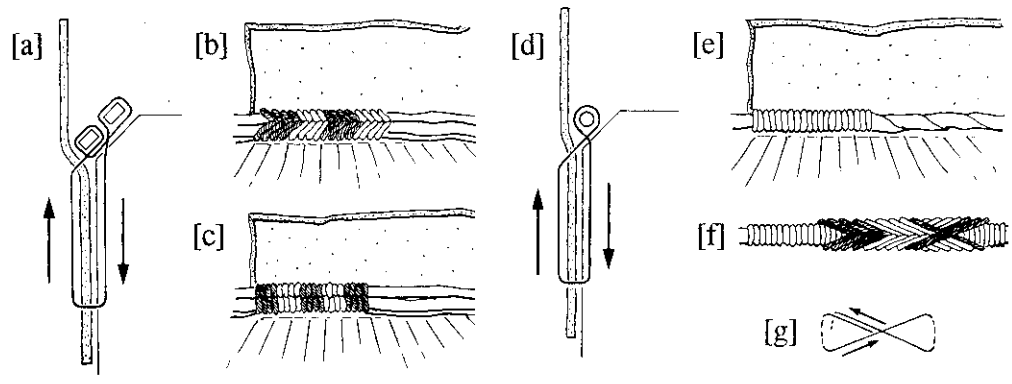

Figure 8.16 Romanesque endband constructions: [a], double endband support (slit thong) accommodated in the spine slant of the bookblock; the endband sewing passes through the tab linings and can be worked as herringbone [b] or straight sewing [c]. A single support [d] may carry a simple primary wound endband [e], which can be embellished with secondary embroidery of the cross-stitch type [f] and [g].

consist of the same white leather as the sewing supports: about half of them (44) are double (often of the slit-thong type), the remainder (37) are single white thongs, sometimes of softer leather and slightly twisted. Double supports are significantly more frequent in the early group (chi-square test, $\chi = 6.2$); the same is true for the herringbone sewing as compared with the later straight sewing ($\chi = 8.8$). The thread is mostly plain and of the same structure as that used in the bookblock sewing, often alternating with a coloured (mostly blue) thread;[12] sometimes more colours are employed, chosen in harmony with the coloured textile facing of the tab (observed in 14 cases). The 37 wound endbands on single supports are worked with plain thread; 16 have remained as such, 21 have been decorated with a secondary embroidery with linen or silk thread in two or more colours. The cross-stitch type of secondary embroidery (not unlike the 'alla greca' endbands, see Figure 6.18[d]) is the most frequently used (18); only in three instances, all dating from the early fourteenth century, was a secondary sewing of the renaissance type found (see Figure 9.25). Cross-stitch type of secondary embroidery on romanesque bindings was observed by Grosdidier de Matons et al. (1993) on French bindings, mostly from Clairvaux. This is earlier than the findings of Säuberlich (1979) on material from Saxony: he found a consid-

Table 8.4 Endband supports and endband sewing in 81 romanesque bindings

	Double supports			*Single supports*		
	Herringbone	*Straight*	*Total*	*Blank*	*Compound*	*Total*
Early group	20	8	28	7	2	9
Late group	4	12	16	9	19	28
Total	24	20	44	16	21	37

erable number of endbands with single supports, but the cross-stitch embroidery occurred seldom before the fourteenth century. Figure 8.17 illustrates two variants of romanesque endbands.

In the series of 110 bindings, the shape of the tab could be determined with confidence in not more than 53 cases; 40 have a rounded shape, extending from 10 to 40 mm beyond the spine, the remainder have square shapes (see Figures 7.26[a] to [f]). In 32 cases the tab and back covering are joined by perimeter sewing, partly identical with the types observed in carolingian bindings. The common link-stitch type of perimeter sewing (Figure 8.17[a]) was found in 15 cases, the buttonhole stitch and saddle-stitch type in two cases

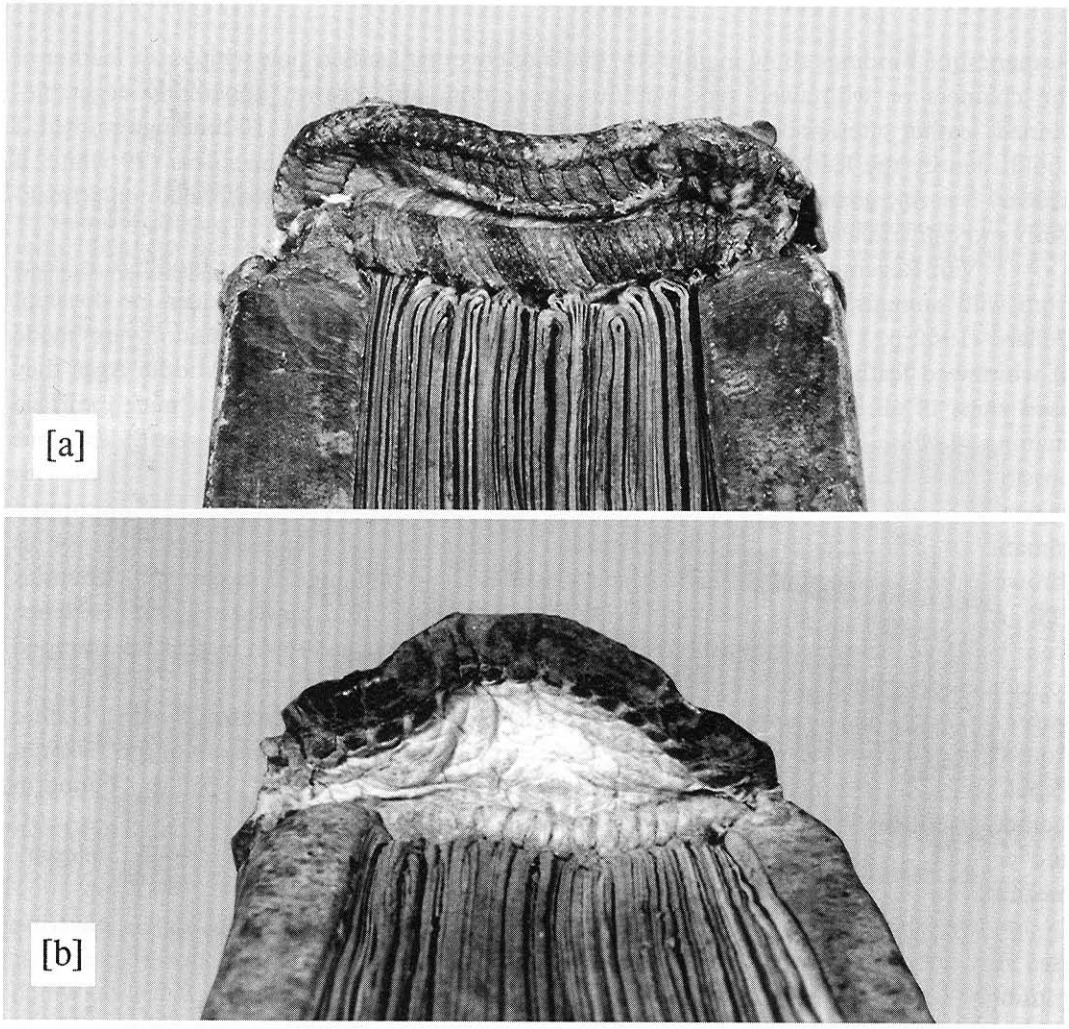

Figure 8.17 Romanesque endbands: [a], herringbone endband sewing in blue and white, link-stitch perimeter sewing in white (Schaffhausen SB Min 33, *c.* 1200); [b], wound primary endband on a single support, the white leather tab joined with the covering leather with brown leather edging (The Hague KB 71 J 63, northern France (?), s. xiii).

respectively (see Figure 7.26[h] and [i]). The remainder are multi-coloured variants including cross-stitch and herringbone perimeter embroidery; the latter mostly on English bindings and sometimes continuing for 10 to 20 mm onto the edge of the cover, reminiscent of byzantine endbands (Clarkson 1993 fig. 12). On French bindings one encounters a joining of the tab and back covering with a neatly stitched leather edging (Figure 8.17[b]). There are apparently many more variants, such as described and illustrated in *Tranchefiles* (1989) and in the survey of Grosdidier de Matons et al. (1993).

8.10 COVERING AND DECORATION

Romanesque bindings show mainly two kinds of covering leather: pale white-grey leather of the chamois or whittawed type without decoration, and brown, apparently vegetable-tanned, leather often preferred for blind-tooled bindings. Out of the 110 bindings studied, I could identify the leather in *c.* 80 cases: wool sheep is used in 36 instances (29 white, 4 brown, 3 pink), goat or hair sheep in 30 instances (27 white, 3 brown), 'chamois' (buck-skin) and calf and even (once) pigskin in the remaining 14 instances.

Van Regemorter (1951) described the leathers of the Clairmarais bindings as skins from wild animals, some of which had retained the hair suggestive of deer- or doeskin. Pollard (1962 p. 13) thought that most twelfth-century English bindings had covers 'made of whittawed leather with ... a suede finish' and suggested that 'in the Middle Ages they used skins of all sorts of unlikely animals'; he also referred to the pink ('puce') surface staining of white leather. Clarkson (1993) assumed that tawed skins were mostly calf, but possibly also deer, goat and sheep. The majority of blind-tooled bindings is covered with vegetable-tanned leathers of largely unidentified origin: in his corpus of 139 decorated romanesque bindings Schmidt-Künsemüller (1985) lists and vaguely describes 84 as 'brown, reddish-brown, etc., leather' and classifies the remaining 55 as calf (26), chamois (11), goat (7), pig (6) and sheep (5).[13] De Hamel (1984 p. 69ff.) provides literary evidence from various catalogues and other sources for the use of red or brown leather for stamped romanesque bindings; one of these sources dates from 1199 and mentions a book bound '*rubeo cordewano impressum*', the earliest reference to the use of the famous Spanish leather from Cordoba for blind-tooled bindings.[14] According to the 1369 inventory of the Avignon Papal Library (Gasnault 1980), the majority of the books (1322 out of 2059) was bound in leathers of green (41 per cent), red (28 per cent), white (18 per cent), black (7 per cent) and yellow (3 per cent) colour; another 44 volumes (3 per cent) had '*coreum tannatum*', meaning probably vegetable-tanned brown leather.

Starch paste was apparently the preferred adhesive for affixing the leather covering (see section 8.8, Figure 8.15). The edges of the turn-ins show no evidence of paring or trimming out. As a rule, the corners are mitred with a single cut (Figure 8.18[a]), which can be further secured with stitches of thread, [g] and [h], and rarely with trenails, [f]. In fact, sewn corners, sometimes with extremely fine stitches, are a prominent feature of romanesque bindings of both English and Continental origin (Figure 8.19). Pollard (1962; 1976) noted the occurrence of sewn corners on English bindings from about 1100, Vezin

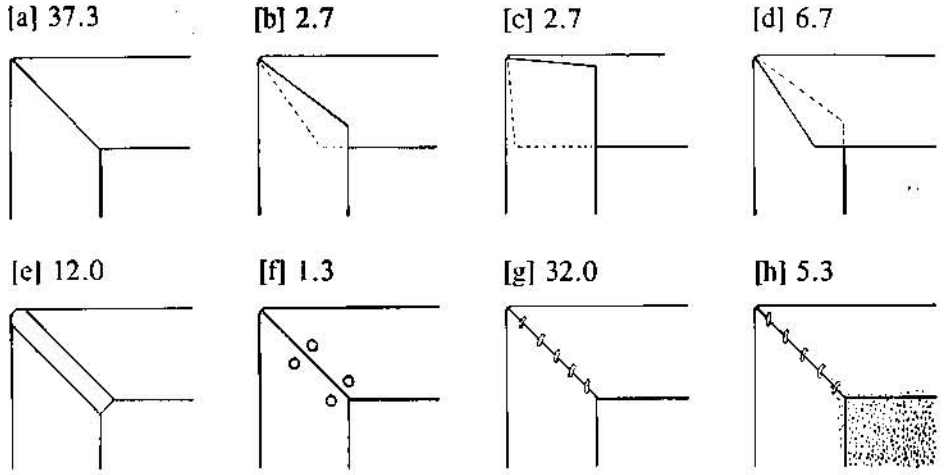

Figure 8.18 Corner turn-ins on 75 **romanesque bindings**: [a], mitred; [b], oblique overlapping from the front; [c], square overlapping from the front; [d], oblique overlapping from head and tail; [e], tongued corner; [f], mitred corner fixed with trenails; [g], sewn mitred corner; [h], sewn mitred corner, board interior filled with gesso (numbers represent percentages).

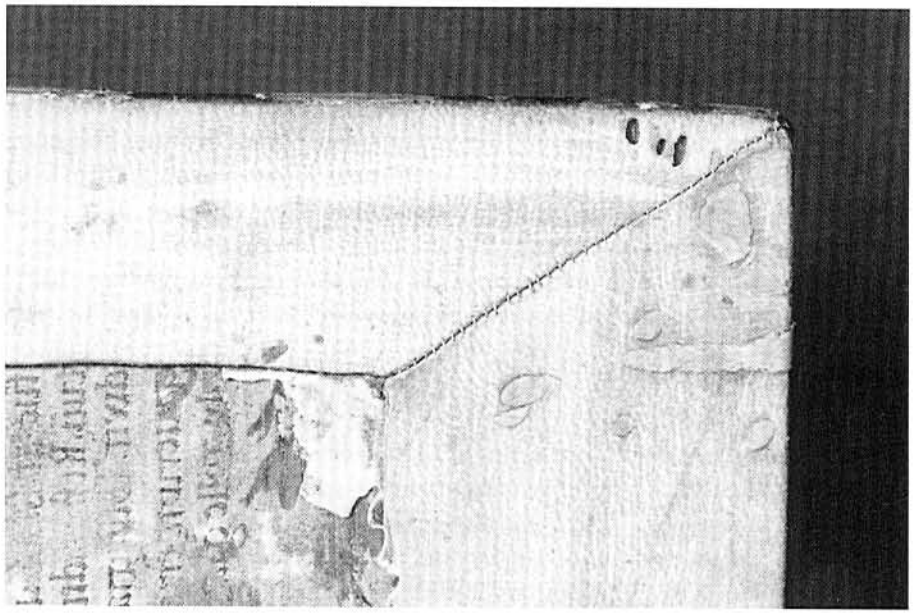

Figure 8.19 Sewn corner turn-in. SG Cod. 175, a rebound ninth-century manuscript with reused carolingian boards; the pastedowns of used parchment, for the most part now removed, lie under the turn-in, which is exceptional for romanesque bindings.

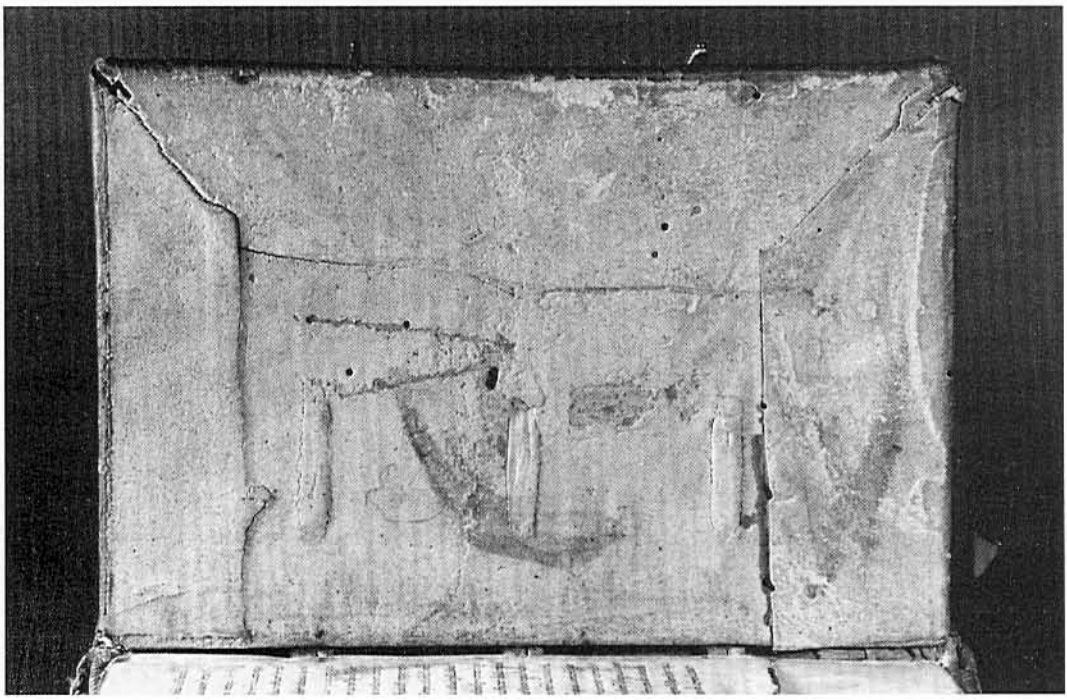

Figure 8.20 Inner face of the board filled with gesso, partially covering the sewn corners and the slips of the sewing supports (Schaffhausen SB MS Min 33, *c.* 1200).

(1974) recorded their use in the eleventh century in France. Tongued corners (mitred double cut, Figure 8.18[e]) were less frequent, and so were the lapped corners, [b] to [d]. Occasionally one can observe on the inner board face, between the turn-ins, a gesso-like substance, often on bindings with sewn corners (see Figure 8.18[h]). It occurs on both Continental and English bindings; sometimes the substance is crumbling but often it still shows a surface so smooth that even light indentations of the ruling of the last leaf can be detected – a lucky piece of evidence that a binding, like several examples from Schaffhausen, had never been provided with an endleaf or pastedown (Figure 8.20).

* * *

Beside the many bindings bound in a single leather covering described above, there are others which have received a second covering, usually with overhanging edges, designated as a 'chemise' or 'overcover'. There are also variants where the covering is not entirely doubled, such as those first observed by van Regemorter (1951) on bindings from Clairmarais. She noticed that the primary covering was reduced to a strip enveloping the board edges and allowing to attach the robust outer cover by stitching. Van Regemorter considered this practice as 'sloppy work', in contrast to that of the binders of Clairvaux who were meticulous in providing a complete primary covering to which the overcover could be

affixed. To complicate matters, the primary covering can be lacking altogether; Pollard (1962 p. 14) thought that 'some of these books may never have had a leather cover permanently attached to them. They had a chemise, which is really nothing more than a leather dust wrapper'. Pollard's reasoning fits in with Vezin's observations (1974) on bindings from Angers, constructed like a modern '*liseuse*' (Figure 8.21[a]).

My own observations have confirmed the fairly regular use of overcovers on romanesque bindings: out of the 110 bindings studied, 20 had an overcover (7 complete, 13 with clear evidence of earlier presence). Seventeen were observed on English material, three were from Northern France or Spain. The most common type of construction I observed is that shown in Figure 8.21[b], characteristic of English bindings (see Clarkson 1993 fig. 13), but also of the Portuguese bindings from Alcobaça (Nascimento and Diogo 1984 p. 59 ff.). At times remnants of the envelope pocket covered up by the pastedown will indicate that the lost overcover had been applied simultaneously with the original binding; in other cases there is evidence, such as the presence of a title or of decoration in places

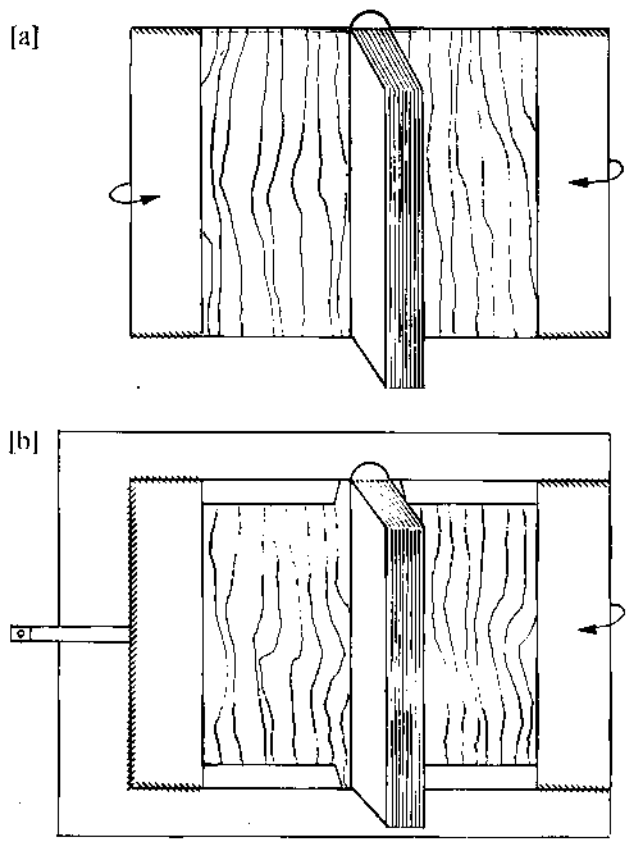

Figure 8.21 Two types of leather overcover: [a], constructed from one piece, wide enough to form two pockets, stitched at head and tail (modified after Vezin 1974 fig. 6); [b], an overcover fastened to an already fully or partially covered binding; the envelope pocket at the lower cover (to the right) is part of the overcover, at the upper cover a separate envelope pocket is inserted (partly after Clarkson 1993, fig. 13).

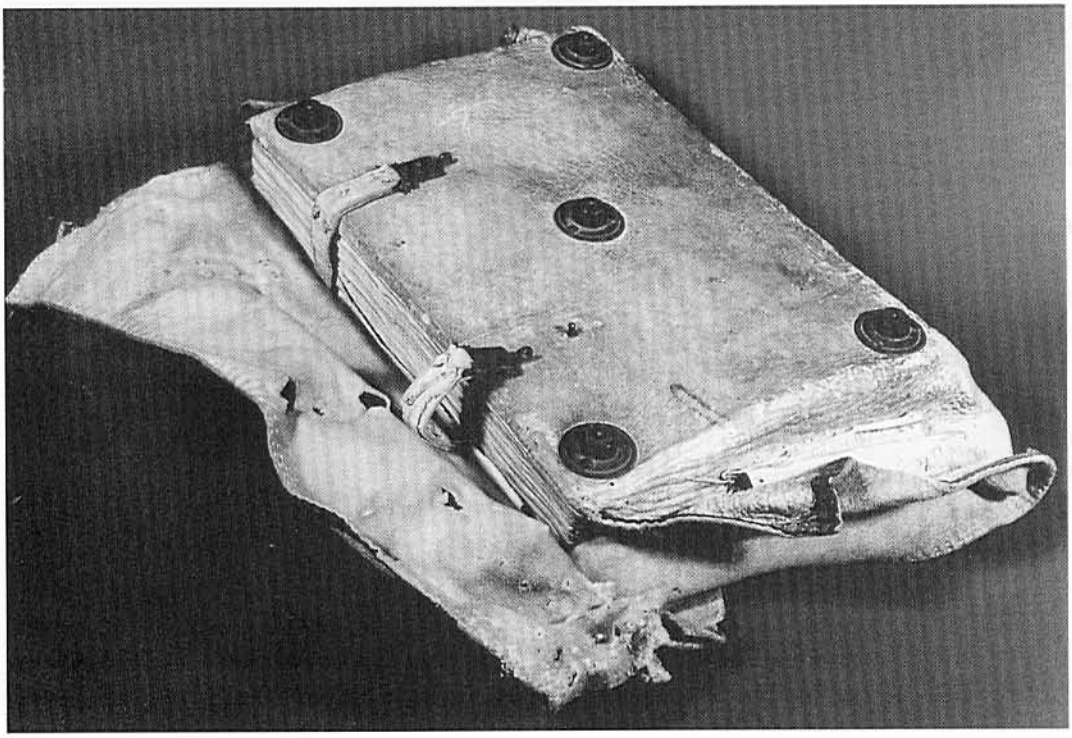

Figure 8.22 A romanesque binding with overcover, bosses and long-strap fastenings (Lisbon UL MS Alc. 244, s. xiii^{in}, from the Monastery of Alcobaça; from Nascimento and Diogo 1984).

hidden by the overcover, that it had been fitted at a later date over an already covered book. De Hamel (1984 p. 84) suggested that some stamped romanesque bindings had received an overcover when they entered religious houses. In addition to stitching, rarely only pasting, metal bosses (see below) are additional means for securing the attachment of the overcover (Figure 8.22).

* * *

Romanesque bindings covered with chamois leather are, as a rule, not decorated, but can have the title written on the back. Pollard (1962 p. 17, pl. II) observed this in about one in eight of twelfth-century English bindings, A. Bruckner (1949 p. 156, Fig. 3) noted lettering on the back of several of the Schaffhausen bindings. Bindings with covering of brown calf or sheepskin were frequently embellished with characteristic blind tooling, composed of individual stamps; they were an important group in the early studies of decorated bindings (see section 8.2 for references; for technical details of blind tooling see Chapter 5, note 11). Another type of decoration was the use of precious textiles for covering: in the already mentioned inventory of the Avignon Papal Library of 1369 some 50 brocade, silk or velvet bindings are entered, some of them embroidered (Gasnault 1980). Such costly materials had also been used for the primary covering of treasure bindings (for examples see Steenbock

1965; von Wilckens 1990), but they have seldom survived the ravages of time; yet many have at least been partly saved after rebinding, as in the case of the *opus anglicanum* embroidery of the Fellbrigge Psalter (Wallis 1987).

A particular type of romanesque treasure binding had covers decorated with champlevé enamel, mass-produced in Limoges around 1200 (see for illustrations and literature Needham 1979 pp. 49ff. and Foot 1986 p. 52). Sadly, most of these covers have been detached from their contents and are marketed by dealers as objets d'art; but even those which have managed to survive together with their contents (like SG Cod. 216) have undergone so much repair that any information on their original structure is lost, as is true for most treasure bindings. The '*tavolette di biccherna*', the painted wooden covers of the account books of Siena, which had been traditionally produced from the thirteenth century onwards suffered the same fate: severed from their binding structure, they too became collector's items, a great many of them even faked.[15] It seems axiomatic that the higher the artistic or decorative value of the cover of a binding, the less chance it stands to retain its structure. This is even true for blind-tooled romanesque bindings: the corpus of Schmidt-Künsemüller (1985) includes not only many empty covers, but even more rebound books with scraps of the original covering pasted on top of the new leather.

8.11 FASTENINGS AND FURNISHINGS

Fastenings are a regular feature of romanesque bindings: only eight out of the 110 cases studied have no evidence of their existence, yet very few have survived in a complete state. From vestiges such as remnants of straps, pegs and peg holes a fairly precise reconstruction of the fastenings could be made for 71 of the bindings studied. There are two main categories: a smaller group (17) of edge fastenings as taken over from carolingian bindings (see section 7.9, Figures 7.30 and 7.31), and a larger group (54) of fastenings of the long-strap type which appears for the first time on romanesque bindings (Figure 8.23). All 17 edge fastenings occurred on bindings from the Germanic area; all but four long-strap fastenings were on bindings of French and English origin. This very significant difference (chi-square test $\chi = 48.0$) indicates that the edge fastenings were preferred in Central Europe; moreover, the edge fastenings are clearly the earlier form, since virtually all of them occur on pre-1200 bindings. The long-strap type – which can be seen as a result of shifting the peg from the edge to the side of the board – continues as the foremost fastening mechanism well into the fifteenth century (see section 9.11). The majority of the long straps (48 out of 54) is hinged from the upper cover, a finding which agrees with the observations of Pollard (1962) and Clarkson (1993) on English bindings and those of Nascimento and Diogo (1984) on bindings from Portugal. Six fastenings, hinged from the lower cover, originate from the Germanic area.

In the long-strap fastening, the strap is recessed into the board close to the edge. It consists usually of two layers of leather (chamois, white or pink, seldom brown) which are neatly stitched together, sometimes with parchment sandwiched in-between; often there are remnants of a textile covering. The hasp may be of solid metal, usually bronze alloys and

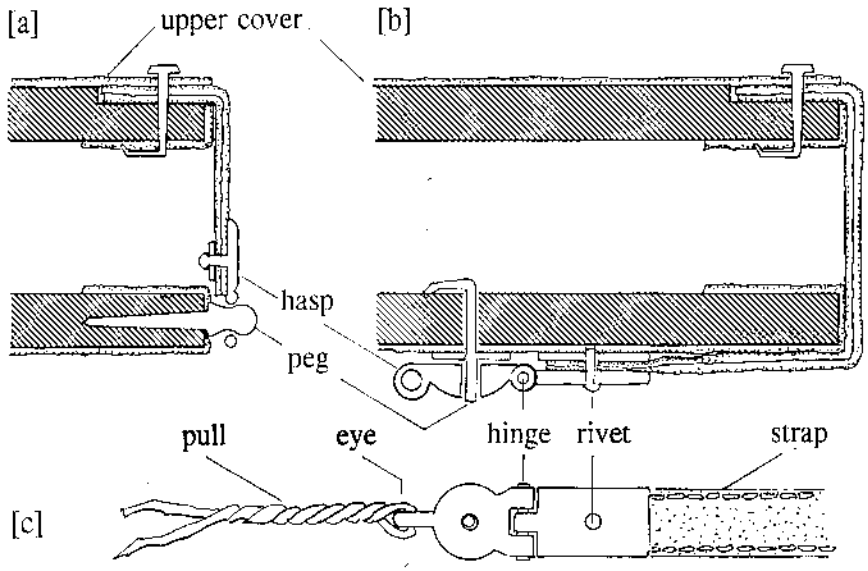

Figure 8.23 Construction of the two main types of fastenings found on romanesque bindings: [a], edge fastening (the same as on carolingian bindings, Figures 7.30 and 7.31); [b], long-strap fastening; [c], details of a hinged hasp over a side peg with base plate and a leather pull.

seldom iron; it has a central hole to fit over the peg, may incorporate a hinge and usually has an eye to attach a pull for easier handling (see Figure 8.23[c]). The hasp may be decorated with geometric, floral or animal designs. Simpler forms of the hasp are made of two small metal plates with the strap held and riveted in-between, or of a small sheet of metal folded into half and slid over the strap (see Figure 9.48).

Whereas fastenings were fitted to at least 90 per cent of romanesque bindings, protective bosses or their remnants or other metal appendages are found less frequently. Out of the 110 bindings studied, 40 per cent have no evidence of bosses; traces of these were found on five bindings, extant bosses (and a single case of corner pieces) on another five. Evidence of later chaining (traces of chain clips) was observed in about one third of the bindings. Similarly, the calculation from Schmidt-Künsemüller's (1985) data showed that not more than 24 per cent of the bindings he studied have evidence of bosses (including seven still present).

Metal bosses are of two kinds: simple half-domes, formed from sheet metal probably with a dapping-die punch in a hollow, and cast metal bosses turned on a lathe.[16] Although iron was occasionally used, copper alloys were the standard material. Usually an iron nail (pin) is mounted in the cavity with soft solder, to serve as means of fastening the bosses to the cover. Holes with traces of rust and corrosion on corresponding areas of the outermost leaves are often the only evidence of earlier bosses; discoloration of the leather and imprints on the covering can determine the diameter (usually 15 to 30 mm). The presence of bosses and other furnishings should be judged with caution: they might have been added at any time, for example when books were chained and placed on a lectern, or when

a protective overcover was provided and additionally secured with the bosses. We are fortunate in having at least one instance of literary evidence for the use of bosses in the twelfth century: a certain Henry, Benedictine monk of Hyde Abbey, near Winchester, transcribed some classical authors in 1178, and recorded that he himself made the book, illuminated the initials and formed the brazen bosses of the covers with his own hands.[17]

Finally, two other types of metal furnishings, encountered on romanesque bindings, should be mentioned. First, frames (*'fenestrae'*) made of strips of brass, fitted around or over parchment title labels with a protective sheet of transparent horn; as a rule, they had been nailed onto the lower cover. Second, clips and rivets or their traces which had been used for chaining books on lecterns, usually in later periods. The shapes, dimensions and location of chain clips should be carefully recorded, since they constitute significant clues for reconstructing the provenance of books; an example of the use of such evidence for a series of books from Buildwas Abbey was presented by Sheppard (1995). For details of chaining and various lectern systems see section 9.12 and Figures 9.58 and 9.59.

8.12 FUNCTIONAL ASPECTS

At first glance the romanesque binding structure does not seem to differ significantly from its carolingian predecessor. Like the carolingian bindings, the vast majority of romanesque bindings have a smooth flat back; out of the 110 bindings studied, the spine shape is flat or concave in *c.* 84 per cent (in the carolingian bindings this was 98 per cent; see section 7.10, Figure 7.33[b]). The geometry of the attachment of the sewing supports, entering the square board edge, did not allow for any easier flexing or opening of the cover, and the leverage action – and consequently the strain on the supports – has even become stronger where the spine lining had been extended to the board edge (cf. section 8.8, Figure 8.14). This construction is largely responsible for the often encountered breakage of the heavy thong sewing supports (Figure 8.24).

We can only speculate about the reasons that motivated the replacement of the relatively thin cords by heavy thongs, characteristic of the sewing supports of romanesque bindings. Clarkson (1993 pp. 185, 190–1) reasons that the use of heavy bands counteracts the tendency of the spine to 'peak' (that is, to open at a very sharp angle), since they are less likely to kink or bend between the threads of the herringbone sewing. The same argument may favour the use of packed sewing and the cross-stitch type of single-station sewing, where the increased number of windings around the support will augment its firmness, thus aiding the even distribution of strain across the spine and controlling the opening arch (Clarkson 1996b pp. 222ff.). But increasing the bulk of the sewing supports, and particularly their thickness, will make the spine less flexible, which will require greater strength of the sewing structure when the book is opened. Increasing the mass in order to improve function is not always the answer: the greater sturdiness of the thongs goes at the expense of their impaired flexibility and leads to breakage instead of a resilient bending.

The first appearance of straight sewing on romanesque bindings means the gradual abandoning of the benefit of herringbone sewing, that is, linking up each quire with its

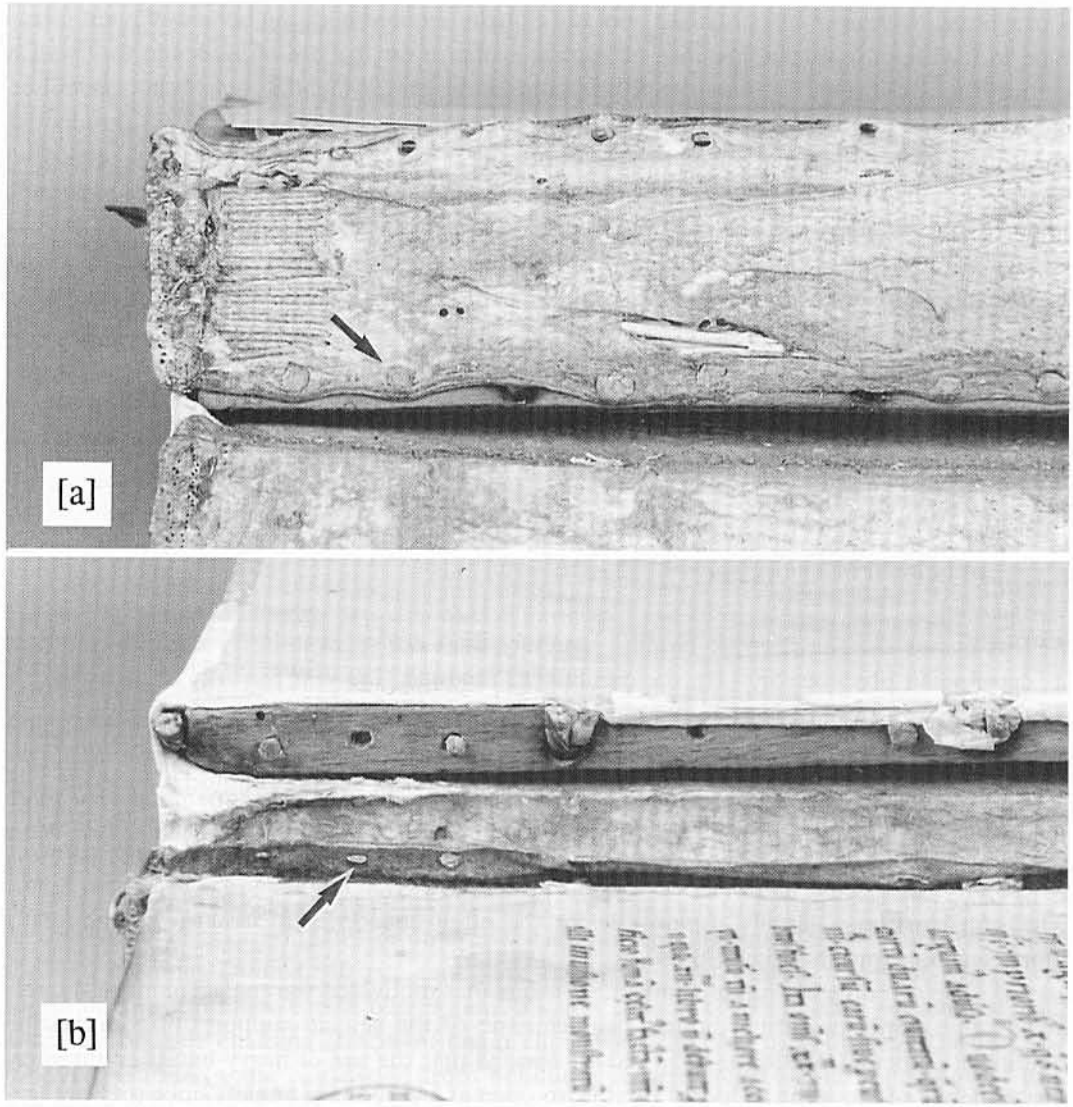

Figure 8.24 Spine lining and broken sewing supports on a romanesque binding: [a], the continuous spine lining of chamois leather is still attached with trenails onto the spine edge of the lower board (arrow); [b], the slit-thong white leather supports at the upper board are broken, exposing the detached lining with holes of the trenails (arrow; Engelberg StiB, MS 17, s. xii).

neighbour at every sewing station, in contrast to straight sewing where this is reduced to the link at the change-over stations only. An exact dating of this change cannot be given in view of the limited data, but my observations suggest that straight sewing, as well as packed straight sewing, became more frequent after 1200. Even less can be said about single-station sewing, except that it never caught on as straight sewing did, eventually becoming the preferred method.

NOTES

1. Loubier (1908–9) interpreted the pictures in Bamberg SB Msc. Patr. 5 and published the first literary evidence for the sewing frame from the 1483 inventory of the Michelsberg monastery, which includes '*una mensa cum septum tenaculis*' (in a contemporary German version '*I binttisch mit VII schrawben cum requisitis*'). The leaf carrying the illuminations is mounted on a guard and hooked around the endleaf quire of used parchment, added during rebinding in the second half of the fifteenth century (Dressler 1971); although the illumination certainly originates from the Michelsberg workshop, there is no irrefutable evidence that the leaf originally belonged to this manuscript. In the past, supported sewing without the use of a frame was generally considered infeasible. Helwig (1970 p. 23) assumes that the carolingian binder did suspend the sewing supports, but does not explain how. Pollard (1962 p. 5) felt that 'a book can be sewn without sewing frame', whereas Vezin (1981 p. 38) firmly states '*qu'il est matériellement impossible de faire une couture sur nerfs sans cousoir: ce dernier doit donc apparaître dès le VIII siècle*'. Federici & Pascalicchio (1993 p. 211) believe that for carolingian sewing on double cords 'the use of a sewing-frame was not necessary', but 'that sewing on leather thongs [. . .] seems to be devised for a sewing-frame'. Bozzacchi (1996) sees no need for the sewing frame for herringbone sewing, which agrees with my experience: holding the supports in the hand and being able to flex them gives a better view and control of the cord tension.
2. This concerns MS 22400 of Nuremberg GNM, Evangeliary, Rhineland (?), s. xii, a treasure binding stripped of its metal covering, yielding full access to the binding structure. Dr Ursula Mende kindly informed me that it was rebound a few decades ago, which regretfully obliterated the evidence (her letter of 15 August 1996).
3. Van Regemorter (1951) did not provide the number of Clairmarais bindings she studied. From the data of Bondéelle-Souchier (1991 pp. 80ff.) it would appear that some 42 manuscripts (shelf-marks given) have still retained their medieval binding; one of them (St. Omer BM MS 137) is illustrated by Vezin (1981 p. 44).
4. I studied romanesque bindings of Continental origin in St Gall StfB, Schaffhausen SB, Vienna ÖNB, Wolfenbüttel HAB, New York PML, Leiden UB, Utrecht MCC and The Hague KB; the English material is derived from the collections of the British Library, Cambridge UL, Hereford Cathedral Library, Shrewsbury School Library and Oxford Bodleian Library. In the latter, I had the opportunity to re-examine a number of bindings and the original radiographs studied by Pollard (1962; 1975).
5. Kindly drawn to my attention by Prof. J.P. Gumbert.
6. It is generally assumed that whittawed leathers were produced in medieval times by the 'whitetawyers', employing alum (potassium aluminium sulphate) as the main active agent. This and similar mineral treatments are not entirely irreversible and hence they are considered a kind of 'semi-tannage' and do not produce leathers in the true technical sense, in contrast to the complete and irreversible tannage as obtained with vegetable tannins, chromium salts or combined tannage. Nevertheless, in the following the term 'leather' is used in the broader sense, as the kind of tannage cannot be determined without the use of analytical procedures.
7. The term 'straight sewing' is used to describe the sewing on double or single supports, where the support is circled by the thread without making links with the previously sewn quire. Straight sewing on double supports follows rendering the capital letter B, and a figure-of-eight if additional turns are made around the support. The latter system, already met in romanesque bindings, was first reported in a rebinding from 1641 of a 1558 Basle imprint and termed 'arch sewing' ('*Rundbogenheftung*') by Franck (1941; 1949). Here the more descriptive term 'packed sewing' (Clarkson 1996b p. 223) is preferred.
8. It has been a misconception that in the earliest bindings the endbands were always sewn simultaneously with the bookblock (Adam 1904–6; 1911c; Loubier 1904; 1926). Today we know that, as a rule, sewing of carolingian and romanesque bindings was done in two operations, which involved first the sewing of the bookblock, and, after trimming, the sewing of the endband; these two operations were termed 'primary' and 'secondary' sewing (Pollard 1962). Ambiguously, these two terms are also used for endband structures, namely the 'primary endband sewing' that can be embellished by a 'secondary sewing' or embroidery. I prefer 'bookblock sewing' and 'endband sewing' for clearer distinction, and reserve the adjectives 'primary' and 'secondary' for endbands. Simultaneous sewing of bookblock and endband is a later development (see section 9.4); it will be called 'integral sewing' and the endband 'integral endband' (*'mitgehefteter, echter Kapitalbund'*, *'tranchefile à la couture'*).
9. I am thankful to Michael Gullick who passed on to me some of his eminent knowledge of the romanesque bindings in the Hereford Cathedral Library during my visit in July 1992.
10. The only instance of beech boards on romanesque bindings I found in England was Cambridge UL Ff. 3. 35 (s. xii, origin unknown), which I am inclined to consider to be Continental on account of its fastenings and

other traits. Michael Gullick assured me (personal communication) that the script of this manuscript is probably German or Austrian, but certainly not English.

11. For instance, the painted edges of SG Cod. 57 (s. xiii) are very likely a later embellishment as indicated by spilled paint on the edges of the cover. The gilt edges of PML M 338 (Needham 1979 pp. 61ff.; s. xii^{ex}) are unlikely to be a contemporary feature, since the binding shows evidence of many later interventions. Although decorated edges have been described on a number of bindings of late medieval manuscripts (Foot 1993 pp. 439–54), the fact that most of them were rebound makes the dating of the decoration uncertain.
12. Colour analysis by Raman spectroscopy determined the blue of the thread of a twelfth-century endband to be of indigo (Guichard and Guineau 1986).
13. The identification of medieval leathers is far from easy, a fact often overlooked by scholars in the past. For example, Schmidt-Künsemüller (1985) refers to many leathers as calf, which in fact are hair sheep, and at least eight of his assumed 11 'chamois' skins are rather wool sheep; similarly, most of what he classified as 'pig' are in fact sheep, with the often coarse follicle pattern mistaken for the distinct triple configuration of follicles in pigskin.
14. Cordovan leather (cordwain) is frequently cited in early literary sources that generally praise its superior quality but say little about its origin and tanning. Gay (1887 pp. 427ff.) indicates that already in medieval times the term had become generic and that cordovan leather was produced in France, Flanders and even Norway, by tannage specified as *'passé en tan et non en galle'* [tanned by sumach?]. Waterer (1946 pp. 160ff.; 1971 pp. 15–27) feels that originally it meant 'vegetable-tanned goatskin'; but he also cites data suggesting that it was made by alum tawing from the skin of the mouflon, a hair sheep once indigenous to Spain but now virtually extinct.
15. The Biccherna was the office of the financial magistrate of the city of Siena and handled all payments and taxes; the first accounts date from 1226. The chief official, the Camarlingo, was usually a monk of the Cistercian abbey of San Galgano, which apparently guaranteed integrity; the collected accounts were bound up every half year [in the Abbey?] and Sienese painters were commissioned to paint the cover, including portraits of city magistrates. The custom was followed by other local bodies, such as hospitals and fraternities. A good summary of the subject in English is given by Lightbown (1963); the corpus of all known Biccherna covers was published by Borgia et al. (1984).
16. The lathe for turning soft metal alloys was in use by the twelfth century as testified by its description in the treatise of Theophilus *On Divers Arts* (see Hawthorne and Smith 1979; Brepohl 1987). The versatile author, most probably the German Roger of Helmarshausen, must have been familiar with many material aspects of bookmaking, as evidenced by an extant treasure binding by his hand, an exquisite example of enamel, gem and filigree work (Trier, Domschatz MS 139, illustrated in Steenbock 1965 no. 79). For further details of the use of the lathe in medieval times see Woodbury (1961).
17. '*Suis manibus apices literarum artificiose pinxit et illuminavit, necnon aereos umbones in tegminibus appinxit* [sic]', cited after Warton (1824 p. cxlv). The term 'appinxit' is obviously misspelt, since 'painting' the bosses on the cover is unlikely; 'affixit' might have been the original term.

Chapter 9 Gothic bindings

9.1 INTRODUCTION

The increase in book production towards the close of the fifteenth century meant an increasing volume of work for the binder: in addition to the workshops of monasteries and new religious orders, private craftsmen joined in to serve the growing market. More work also led to more experience and there is evidence that the bookbinder had learned from the past and continued to improve his techniques. Also, he had to satisfy the increasing demand for embellishment and to master new methods of decoration which were introduced in the heyday of the wooden-board binding.

At the same time there is even more evidence that increase in book production had a negative effect on the quality of the binder's work. The introduction of printing overwhelmed the humble craftsman who had no adequate response to the 'artificial writing', the *ars artificialiter scribendi*. An estimated 27 000 printed editions had been produced during the second half of the fifteenth century, amounting to some 18 million copies (Neddermeyer 1996; 1997). They all had to pass through the binder's hand and it is hardly surprising that he failed to keep up his standards. Already in the 1480s the binders of Nuremberg, faced with the phenomenal output of Koberger's presses, had started to compromise on the quality of their materials but even more on that of their work. The earliest examples of 'publisher's bindings' furnish clear evidence of a gradual decline in the solidity of the binding structure which was to continue in subsequent centuries (Pickwoad 1994).[1]

But not only did the amount of work increase; the binder had to adapt to a diversification of the product: bulky manuscripts on parchment or paper, folio editions of the early presses, handsome Books of Hours and Breviaries to be carried on the girdle, administrative records for city magistrates or religious pamphlets and popular vernacular literature to be sold by hawkers in the market. Much of it, ephemeral, disappeared and we may never know their binding structures. Sturdy bindings in wooden boards had a better chance of survival, although religious and social upheavals in the coming centuries tended to destroy indiscriminately. Many of the extant late medieval wooden-board bindings are plain or tooled with only some blind lines; but there was an increasing clientele that was prepared to pay for decoration of various degrees of luxury. Most of these – like the elaborately blind-tooled bindings or the cuir-ciselé bindings in Austria and Germany, the first gold-tooled bindings from Naples and Florence or those of Matthias Corvinus in his royal library of Buda – were based on the gothic wooden-board binding structure.

The main typological feature of gothic bindings is that the slips of the sewing sup-

ports enter the board over the bevelled edge of the outer face. The earliest gothic board attachment dates probably from the early fourteenth century; it had remained the standard type until the wooden boards were gradually displaced by pasteboard. The gothic wooden-board binding continued to be used throughout the sixteenth and seventeenth centuries, and even much longer for books intended for the Church. The latest date of the bindings discussed in this Chapter is 1600.

9.2 EARLY LITERATURE AND RECENT STUDIES

Although thousands of original gothic bindings have survived, our knowledge of them is more or less confined to their decoration, which had been the main focus of interest of most scholarly research on gothic and renaissance bookbindings; Goldschmidt (1928) and Kyriss (1940; 1951–58) are exceptions in having given attention to some technical aspects. Much more valuable data have been gathered by a number of practitioners, binders and restorers, fascinated by the history of their craft. German master binders were the foremost pioneers, like Paul Adam (1849–1931), who even in 1890 had attempted to sum up in a monograph the history of bookbinding, including its techniques (Adam 1890); co-founder of the monthly journal *Archiv für Buchbinderei* (1901–43), he published dozens of articles on various aspects of old binding techniques, joined by other binders like Paul Kersten (1865–1943), Heinrich Lüers (1899–1946) and Adolf Rhein (1885–1964). Even if less cautious than today's scientific standards would require, these accounts remain a treasure-trove of details of late medieval bindings, of which a number have perished since then. Regretably, interest in this work remained confined to the binders' circles and had little impact on scholarly endeavours; monographs on the history of bookbinding by Paul Adam and Adolf Rhein respectively remained unpublished.[2] A valuable contribution by a devoted craftsman is that of Heinz Petersen (1908–91), who produced models of a large number of old bindings; one would wish that more salient details had accompanied the publication of this collection (H. Petersen 1988). His son Dag-Ernst Petersen continued his work with a succinct but informative monograph on German medieval bindings, many of the gothic type (D.-E. Petersen 1975). Finally, between 1961 and 1985, Karl Jäckel published a series of concise reports on structures of late medieval bindings, based on findings during the course of restoration work of Bavarian library holdings.

This particular interest in Germany was undoubtedly stimulated by the fact that the earliest published Western binding manuals, namely Zeidler's *Buchbinder-Philosophie* (1708), Prediger's *Buchbinder- und Futteralmacher* (1741–53), Bücking's *Die Kunst des Buchbindens* (1807) and many others (for a bibliography of the early bookbinding literature see Pollard and Potter 1984), had originated in Germany. Although beyond the actual period of gothic bindings, such sources contain many relevant details on earlier practices which had been held in high esteem by the very traditional German binders.[3] Two slightly earlier sources from the Low Countries, a treatise by the German Anshelmus Faust of Antwerp (1612) and the notebook of Dirk de Bray of Haarlem (1658), became known only recently; they likewise contain interesting details.

It seems that other European countries have been less fortunate in having their history of early bookbinding techniques recorded to a similar extent, except for England, where the pioneering work of Middleton (1963) disclosed many data on gothic bindings, and so did contributions by Pollard (1956; 1976). For France, only the academic thesis of Carvin (1988) on bindings from Southern France contains some data on gothic binding structures, a work marred by the very deficient way the data are presented.[4] From other countries no systematic technical studies have been reported, except for a contribution by Nuska (1965) which includes a typological outline of late medieval binding structures from Bohemia.

Another source for details of gothic bindings is archival material. Inventories of monasteries or of deceased dignitaries or craftsmen, medieval library catalogues, testamentary documents, account books and even notes in the bindings themselves may contain information which can throw light on the use of materials used, binder's tools, characteristics of various types of binding, etc. Finally, archaeological finds may also contribute information. Excavations at the Royal Castle of Buda, carried out during its reconstruction after serious damage in World War II, provided evidence of a former bindery that must have been active on the site during the reign of Matthias Corvinus (1458–90). A number of metal furnishings, discarded in a damaged state, indicate that repairs and rebinding had been a regular practice by the end of the fifteenth century (Irás-Melis 1974; 1980; 1985). Over 20 stamps from about 1500 were excavated during plumbing works at the University of Cracow in 1910; their impressions could be identified on bindings of the Polish humanist Nikolaj Czepel (Chmiel 1917).

* * *

For the following description of gothic binding structures, information in the aforementioned literature as well as data compiled during my own studies have been analysed. My studies comprised a total of 410 bindings, dating from *c.* 1300 to 1600, that fall into three groups (Table 9.1). Group A is a heterogeneous sample of 170 bindings, with its main core the fourteenth- and fifteenth-century bindings of St Gall Stiftsbibliothek, selected for their exactly dated contents; the remainder are examples in various libraries on the Continent and in England, often chosen because of special features, such as girdle books, bindings from the library of Matthias Corvinus or bindings of special provenance.[5] Group B consists of 110 bindings of the chained library 'Librije' in Zutphen, in the Netherlands, of which about one half belong to the original holdings that had been purchased and bound for the library prior to its opening in 1564.[6] Group C comprises 130 carolingian manuscripts of St Gall Stiftsbibliothek, rebound in the middle of the fifteenth century, and form a typical example of gothic bindings produced in the course of refurbishing schemes of monastic libraries.[7] To facilitate certain statistical comparisons, the bindings of Group A have been further split into two subgroups with 1450 as the dividing line; for Group B, 1540 was chosen for a similar subdivision into an 'early' and a 'late' group.

Admittedly this sample is not only very small but also heterogeneous in several ways. As for geographical distribution, the bulk of the material originates from St Gall and the Lake Constance area (45 per cent), followed by the Low Countries and the adjoining

Table 9.1 Groups of gothic bindings studied

Group	*Date*	*Manuscripts*			*Imprints*		*Total of bindings*
		Parchment	*Mixed**	*Paper*	*Parchment*	*Paper*	
A: General	1300–1599	50	8	72	2	38	170
B: Zutphen Librije	1472–1599	–	–	–	–	110	110
C: St Gall rebindings	1436–1461**	130	–	–	–	–	130
Total		180	8	72	2	148	410
Percentage		43.9	1.9	17.6	0.5	36.1	100.0

* textblock containing both paper and parchment

** period of rebinding

regions of the Rhineland and Westphalia (33 per cent); the remaining part (22 per cent) comprises, in about equal shares, bindings from Germany, Austria, Hungary, Italy and England.[8] Another variation concerns the different materials of the textblock, namely parchment or paper, as shown in Table 9.1; there are also marked differences in the dimensions of the bindings. Except for the bindings of Group C which are intentionally included here as rebindings, all bindings are original and contemporary, unless indicated otherwise; the assumption that a text had received its binding shortly after its completion may not always hold for printed works, since mostly they were sold in sheets and might have remained unbound for years.[9]

9.3 TEXTBLOCK AND ENDLEAVES

The introduction of paper, which gradually had become the chief textblock material of gothic bindings, caused some misgivings: it was thought to be inferior in strength and sometimes measures were taken to compensate for its alleged weakness. Scribes occasionally combined their paper manuscripts with parchment, for example, adding an outer or inner parchment bifolium to every quire or to the outer quires only, or making the outer quires of the textblock entirely of parchment; eight variants of such mixed textblocks were observed in this study. The binder often reinforced the centrefolds with guards of parchment strips, similar to the practice in Coptic papyrus manuscripts (see Chapters 1, 2 and 3 and Figures 1.2 and 3.3). Normally, these guards are of a total width of 10 to 20 mm, a length slightly shorter than the height of the quire, and are loosely inserted in the centrefold; often they were cut from used manuscripts. The sewing holes of the guards are usually pierced, even if those of the quires are cut. The use of parchment guards was observed in 54 of 72 paper manuscripts (75 per cent) but only in 6 of 53 incunabula (11 per cent); in most cases (49) guards were present in the centrefold of all quires, in four cases in the outer

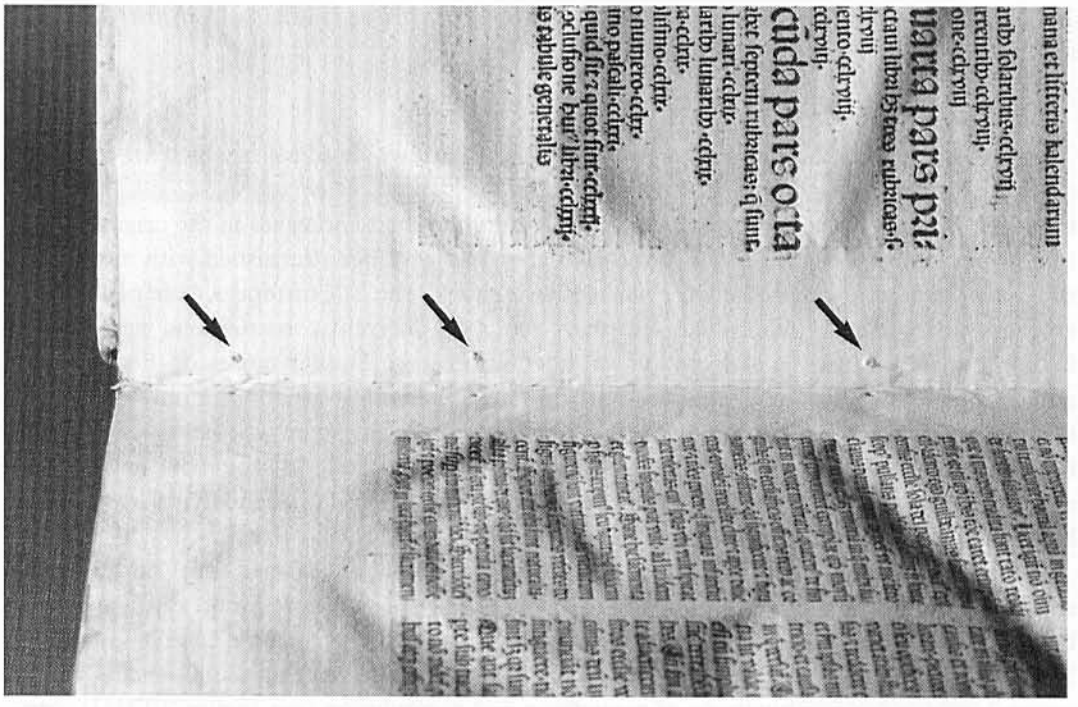

Figure 9.1 Corrugation or cockling of the paper over the printed area. Note also the marking up of the sewing stations with tiny holes pierced through the whole thickness of the quires (arrow); Strasbourg imprint of 1486, bound in Southern Germany (Tübingen UB Gb 825).

quires only and in three cases in the first and last two quires; in another four cases all quires had an inner and outer guard.

Paper began to replace parchment as writing material long before the invention of printing. While sizing the paper was a prerequisite for preventing the writing ink from bleeding, it was not essential for printing and in fact many incunabula have been printed on unsized paper. The printing process usually caused deep corrugations, that is, a relief impressed by the type over the text area, whereas the margins remained flat (Figure 9.1). Since unsized papers were unfit to write on and make glosses, a widespread practice in those days, it became the task of the binder to provide the remedy: sizing the printed sheets by soaking them in a warm solution of animal glue, usually with alum added, then drying them on a rope of horse hair and subsequently flattening them by beating with a heavy hammer with a short handle on a massive block of stone. This procedure seems to have become routine in the last quarter of the fifteenth century; early manuals describe it in detail, together with the subsequent folding of the sheets.[10] The sizing and beating did not leave discernible marks on the textblock but rather a smooth surface, in contrast to the relief still visible on unbeaten leaves (*cf.* Figures 9.1 and 9.3). Evidence that the textblock had been beaten can be that it is thinner at the spine than at the fore-edge; this shape was recommended for books to be clasped, obviously in order to provide light pressure (Faust

1612 pp. 72–3; de Bray 1658 p. 25). I often observed this on bindings from the early sixteenth century on (see also Middleton 1988 p. 300).

* * *

The next step for the binder was to provide the textblock with endleaves which are a regular constituent of gothic bindings, unfortunately very often later removed, mutilated or renewed. In the 410 cases studied, only 26 per cent had their endleaves in the original state; in *c.* 6 per cent no evidence was found that they had ever been furnished with any. Since the upper and lower endleaves were not always identical, the 217 instances were not considered as pairs but individually. No less than about 40 different constructions were found, falling into two roughly equal groups: (a) adaptations of the outer quires of the textblock and (b) the addition of a separate endleaf quire. Parchment is usually the only or at least the main constituent of the endleaves; a combination with paper was observed only on textblocks of paper. Blank parchment used for endleaves is rare; it is often of low quality, except for pristine sheets in luxurious works. Usually discarded manuscript leaves have been employed, sometimes several pieces stitched together.[11]

Figure 9.2[a] to [p] summarizes the most frequent (*c.* 90 per cent) endleaf constructions of either type observed in my own series; a few endleaves found elsewhere have been added, [r] to [t]. Most of the endleaf constructions observed by Carvin (1988 pp. 32–41) on bindings from France accord with those represented in Figure 9.2, except for his group 7, which are combinations of pastedown and comb lining (see Figure 9.13[4]), consisting of two separate leaves of parchment overlapping on the spine, in contrast to the conjoint pastedowns of romanesque bindings shown in Figure 8.4[h].

The countless variants of endleaf construction indicate that binders were aware of their vulnerability, notably of the pastedown and/or the flange in the hinge area (see Chapter 5, note 9). The various constructions are unlikely to have been the solitary results of experimenting binders: on the contrary, available evidence indicates that most workshops had their preferred standard type of endleaves. Ker (1954) found only two main variants (Figure 9.2[r] to [t]) in a large number of Oxford bindings, which he could partly ascribe to certain workshops and correlate them with distinct types of decoration and time periods. Similarly, in 130 rebindings of St Gall manuscripts only one type of pastedown is likely to have been employed. On eight Corvinian bindings, originating from the same workshop, I observed uniform endleaves of a blank parchment bifolium, providing a pastedown and a single flyleaf.

As said before, damaged endleaves were often removed and replaced; even more often they fell victim to scholarly curiosity, or they may have been simply cut out to be reused elsewhere. Endleaf construction like [n] in Figure 9.2 should always be considered with suspicion, for stubs are not necessarily original but could be silent witnesses of theft; knife slashes on adjacent leaves sometimes provide evidence.[12]

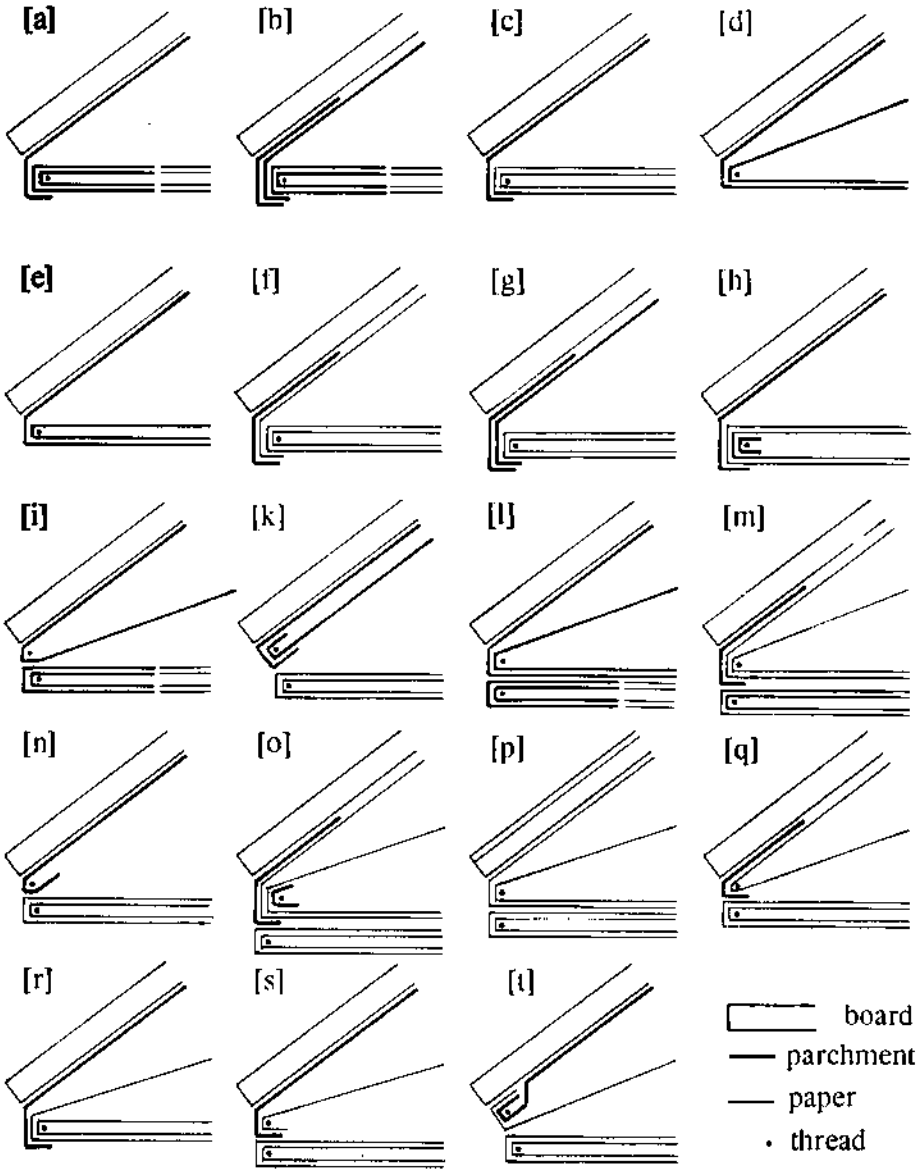

Figure 9.2 Endleaf constructions on gothic bindings: [a] to [h], modified outer quires of the textblock; [i] to [p], separate endleaf quires. A few other types are: [q], endleaves in London bindings (after Middleton 1963 fig. 21); [r] to [t], endleaves in Oxford bindings (after Ker 1954 pp. 226ff.). The flange shown in [b], [f], [g], [m], [o] and [q] usually reaches to one third of the width of the board; types [a], [b], [i] and [l] occur on both parchment and paper textblocks.

Table 9.2 Number of sewing supports on gothic bindings of Groups A, B and C; the data from Schmidt-Künsemüller (1980) have been added

Group	*Number of supports*								*Total of bindings*
	2	*3*	*4*	*5*	*6*	*7*	*8*	*9*	
A: General group	5	73	48	28	8	6	1	1	170
B: Zutphen Librije	–	–	40	46	22	2	–	–	110
C: St Gall rebindings	2	69	52	7	–	–	–	–	130
Schmidt-Künsemüller	3	104	183	88	15	7	–	–	400
Total	10	246	323	169	45	15	1	1	810
Percentage	1.2	30.4	39.9	20.9	5.6	1.8	0.1	0.1	100.0

9.4 SEWING

After having provided the endleaves, the binder would proceed to determine the number and disposition of the sewing stations. Gothic bindings show more variations than their predecessors: I found the number of sewing supports varying from two to nine, as listed for the three Groups A, B and C in Table 9.2. For comparison, data are included from the corpus of cuir-ciselé bindings of Schmidt-Künsemüller (1980), dated to between 1400 and 1500 and originating mainly from Germany and Austria. It seemed of interest to establish whether there is any correlation between the number of supports and parameters like chronology or spine height. For Group A, the correlation coefficient between the spine height (mean = 258.2 mm, *s.d.* 70.0, range from 89 to 455 mm) and the number of supports was 0.37, between the number of supports and the date (1300 to 1600) even lower (r = 0.29). For the Librije Group B, the correlation with the spine height (mean = 364.1 mm, *s.d.* 52.3, range from 170 to 490 mm) was somewhat better, namely r = 0.69, but that with the dating was rather poor: r = 0.19. The bindings from Schmidt-Künsemüller's corpus have a mean spine height of 323.7 mm (*s.d.* 85.1, range 122 to 520 mm); the correlation coefficient between spine height and number of supports was quite high (r = 0.85); no correlation was found between the date and number of supports (r = 0.03). For Group C, the St Gall rebindings of carolingian manuscripts, this testing was irrelevant since the number of supports is virtually identical to those of the original bindings (see section 7.4); this may be explained by the fact that resewing was done using the original sewing holes (see below).

Whereas in carolingian and romanesque bindings no correlation had become apparent between the spine height and the number of sewing supports (see sections 7.4 and 8.3), gothic bindings seem to suggest a certain degree of proportionality: larger books are sewn, as a rule, on more supports. This finding would accord with the binder's technical insight as well as the instructions in the early manuals: de Bray (1658 p. 6) recommends to

'take 3, 4 or 6 bands, according to the size of the book' and Zeidler (1708 p. 65) even specifies the required number of sewing supports for volumes in folio, quarto, octavo, etc.

However, the results of the above analysis are not unequivocal: the rather low correlation coefficient in Group A suggests that other factors may be involved; this group contains many small but rather thick books, which happen to be sewn on relatively more sewing supports than the larger formats. Chronology does not seem to affect the number of sewing supports, and the findings do not accord with those of Pollard (1976 p. 56) who observed that 'the number of thongs (bands) increases from 1250 until 1400 when it begins to decline'. As shown in Table 8.1, the small number of supports on romanesque bindings is characteristic for France and England; thus Pollard's observations may apply to gothic bindings from England but not necessarily for the remainder of continental Europe.

* * *

Further analysis revealed an even spacing of the main sewing stations, deviations exceeding no more than 1 or 2 mm. In contrast, there is a marked variation in the distances between the two outermost main sewing stations and the head or tail edge, as already noted in carolingian and romanesque bindings (see Figures 7.13 and 8.3). These outer segments may vary from *c.* 50 to 150 per cent of the inter-station distance; the head and tail segments of a given volume may be identical or may show a regular difference. The former holds for eight Corvinian bindings from Buda, dating between 1470 and 1490; their head and tail segments are notably uniform, exactly 87 per cent of the inter-station distance. Another example comprises 14 volumes bound for the Librije in Zutphen by the Brethren of the Common Life in Deventer and Doesburg between 1562 and 1572; their head and tail segments are respectively 66 and 82 per cent of the mean inter-station distance, within a very narrow range. This might suggest that workshops followed consistent rules in spacing the sewing stations.

* * *

The sewing holes have been either cut or pierced. Inspection of the centrefolds in gothic bindings is often hampered by the stiffness of the spine. Out of the 170 bindings in Group A, the centrefolds of 131 were accessible; 51.1 per cent of these have single slits, 3.9 per cent double slits for single supports and 45.0 per cent single pierced sewing holes. Relating these data to the bindings' country of origin showed significantly more piercing in England than on the Continent (chi-square test, $\chi^2 = 18.5$). Yet a chronological relationship is also suggested: in Group A, some 50 bindings, mostly manuscripts on paper and dated to between 1350 and 1498, exhibit a significant prevalence of piercing after 1450 ($\chi^2 = 6.7$).[13] For Group B, sewing holes could be identified in 77 cases: the majority (62.3 per cent) has pierced holes, followed by single slits (36.4 per cent) and rarely double slits (1.3 per cent). Pierced sewing holes prevail in the later period (chi-square test $\chi = 18.2$).

All 130 St Gall rebindings (Group C) retained the disposition of the sewing stations of the earlier carolingian sewing (see section 7.4, Figure 7.13[a] to [d]). Only 48 of these bindings allowed inspection of the centrefold; cut slits were found

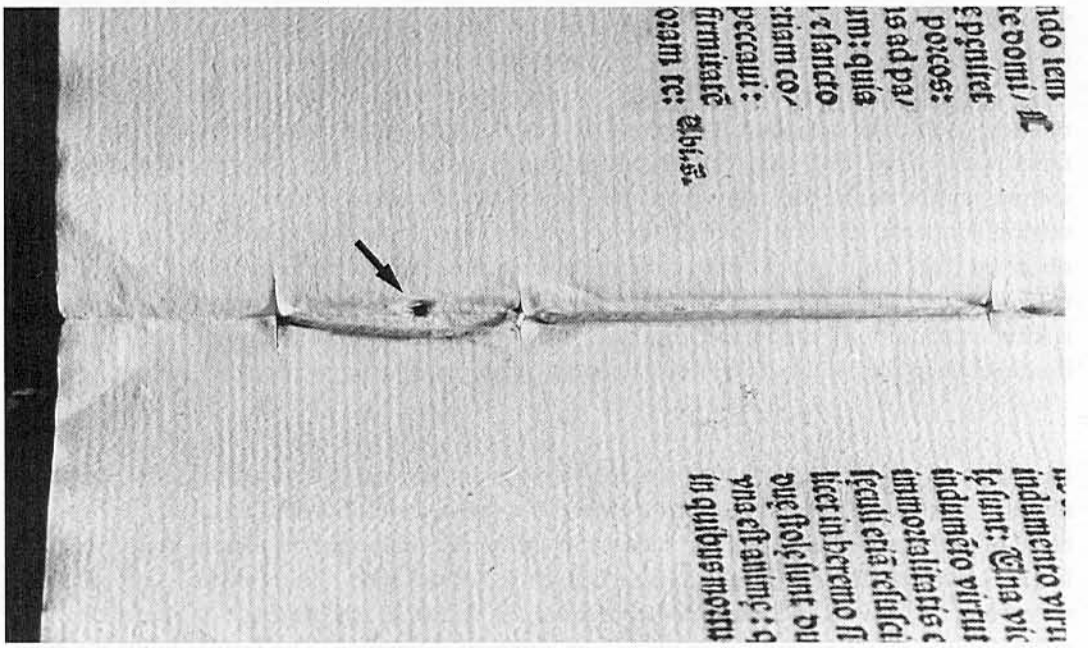

Figure 9.3 Hole in the centrefold, resulting from the puncture by the pin on the tympan during printing (arrow); note the cut sewing holes and the smooth appearance of the paper, likely the result of sizing and beating (Basle imprint of 1494; Utrecht MCC BMH sj 30).

in the vast majority of cases (46, that is 96 per cent), only two having pierced holes; in the original carolingian bindings of St Gall the percentages were 80.9 cut and 19.1 pierced (Szirmai 1995). These findings support the contention that it had been common practice to reuse the original sewing holes when a volume had to be rebound. This is another instance of warning against the fallacy that 'if [there are] no unused punctures [. . .] then the book has never been resewn' (Pollard 1976 p. 54). Redundant sewing holes are clear evidence of resewing, but their absence is no evidence to the contrary; because of this problem rebindings may be difficult to recognize and are repeatedly mistaken for originals.

Unused holes other than those of a previous sewing may occur. Holes of earlier quire tackets (see Figure 7.15[b]), as regularly encountered in carolingian and romanesque bindings, were observed in some ten gothic bindings. These observations are not unique: findings during restoration indicate that quire tackets were regularly used in the fourteenth and fifteenth centuries in manuscripts on parchment (Utrecht UB MS 293, MS 317, MS 406; Leiden UB BPL 131) and single-hole 'tackets' of thread, with or without a knot, in paper manuscripts (Utrecht UB MS 1726, MS 368).[14] Another kind of hole, situated in or close to the centrefold beyond the text area at the head and tail of printed folio volumes, derives from the 'points' (metal pins) placed on the tympan of the press to ensure register of the printed pages (Figure 9.3).[15] Such holes should not be confused with holes of an earlier endband sewing. Finally, evidence can be found along the fold for marking up, as

already mentioned for romanesque bindings in section 8.3 (see Figure 9.1). Observed only in a few instances, their occurrence indicates that this practice, quite common in carolingian and romanesque bindings, was still being observed at the end of the fifteenth century.[16]

* * *

The material of sewing supports in gothic bindings exhibits a greater variation than in bindings of previous periods. From the data of the three groups studied (Table 9.3) it appears that vegetable cord occurs in about one third of the samples. Although in Group A the earliest example of a cord was noted in a parchment manuscript dated to 1405 (SG Cod. 531), its use only became common after 1450 when it significantly replaced leather thongs (chi-square test, $\chi = 23.1$). Thongs have been exclusively used in the St Gall rebindings (Group C), carried out between 1436 and 1461. In Group B cords occur in some 64 per cent, their prevalence in bindings later than 1540 being significant ($\chi = 10.3$). However, in certain groups of bindings the thongs have persisted longer: all eight Corvinus bindings, bound between 1470 and 1490, have white leather thongs, like several other early sixteenth-century Italian bindings. There could also be geographical differences: none of the 24 English bindings in Group A (some from the fourteenth but most from the fifteenth centuries) had cords, which would agree with Middleton's (1963 p. 16) observation that in English bindings cords had started to replace thongs in the late sixteenth century. In Carvin's (1988 p. 45) material from France (fourteenth and fifteenth centuries) only one of the 132 bindings is sewn on cord supports.

The thongs are, as a rule, of white leather; their grain surfaces sometimes suggest their origin, usually of oxen or deer, occasionally of sheep. In Group C, the majority of the thongs are of the deer type, only 20 out of 125 bindings have thongs of pigskin. Brown leather supports were seen only infrequently (*c.* 10 per cent); they are very often broken, in contrast to the white leather supports of which many are still intact. This agrees with Middleton's observation (1963 p. 16) that brown vegetable-tanned thongs are short-lived,

Table 9.3 Material of sewing supports of gothic bindings

Group	*Cord*		*Thong*				*Total of bindings*
	Single	*Double*	*Single*	*Double*	*Slit*	*Twisted*	
A: General	3*	50	8**	7	79	9	156
B: Zutphen Librije	–	70	1	1	38	–	110
C: St Gall rebindings	–	–	–	1	122	2	125
Total	3	120	9	9	239	11	391
Percentage	0.9	30.9	2.3	2.0	61.1	2.8	100.0

* alternating with double cords

** in one case alternating with double thongs

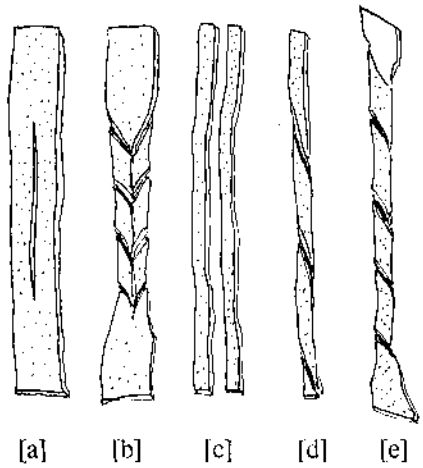

Figure 9.4 Various types of thongs on gothic bindings: [a], slit thong; [b] intertwisted slit thong; [c], double thong whose two parts may be used flat or may also be loosely twisted or used as single supports; [d] and [e], loosely and tightly twisted single thongs.

indicating that already in medieval times vegetable-tanned leathers had been recognized as less durable than alum-tawed or oil-tanned skins. The make-up of leather thongs is sketched in Figure 9.4. The most frequent type ([a], *c.* 90 per cent) is the thick (3–6 mm) slit thong, with a width of up to 20 mm. The intertwisted slit thong [b] is made by pulling one end through the slit several times; it gives two round elements, strengthened by the increased friction. Two single thongs can also be used for a double support [c], which may be loosely or tightly twisted [d] and [e] respectively. There is ample evidence that the thongs had indeed been suspended on the sewing frame: round suspension holes (Figure 9.5) were noted in some 70 per cent of bindings in Group C, easily discernible since most pastedowns had been removed; in Groups A and B these suspension holes are usually slits, as first observed by Rhein (1942b fig. 2 and 3) and later by Gilissen (1983 p. 40, pl. IX, X, XIII, XVII).

Usually the vegetable cords are of the coarse cabled type, 3 to 5 mm in diameter and mostly still intact; in 10 cases (two from St Gall, s. xv, eight from the Zutphen Librije, s. xvi) the material was identified as hemp by the drying-twist test (see Chapter 6, note 9). An unusual type of double cord was observed in eight bindings on paper manuscripts in St Gall StfB, dated between 1425 and 1465;[17] it was made by twisting the two ends of a bunch of threads (Figure 9.6). The thread is a single Z-spun yarn, about 0.4 mm in diameter; according to the drying-twist test the material is flax. The very modest appearance of these bindings suggests that mere lack of suitable cord had prompted this simple replacement.

Table 9.3 shows the appearance of single sewing supports in gothic bindings; I noted the earliest example of single thongs in Amsterdam UB I G 18, dating from 1448. They had probably been in use even earlier: Gumbert (1974 p. 188) observed single twisted thongs in 28 out of 35 original bindings of the Carthusians in Utrecht, dating from before 1430. In a large series of restoration records of predominantly fifteenth-century bindings from the Low Countries, single supports (always thongs) have been documented for *c.* 15 per cent; the earliest dated manuscript was from 1405 (Utrecht UB MS 207).[18] Middleton

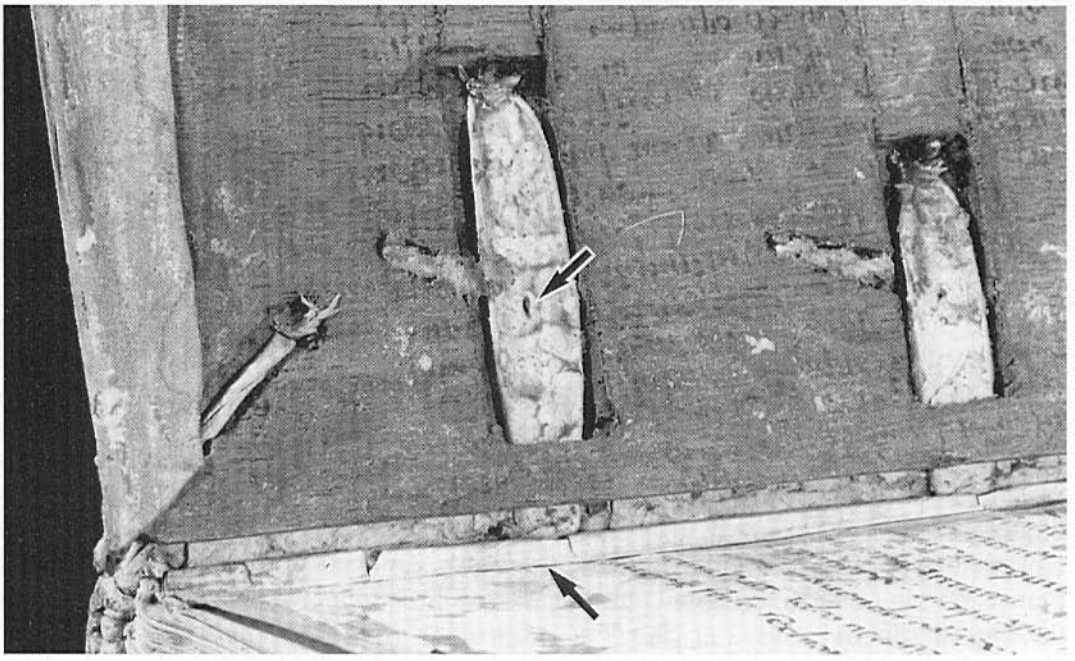

Figure 9.5 Inner face of the upper cover of a ninth-century manuscript rebound between 1436 and 1461. The reused carolingian board has remnants of its original attachment (twisted cords) and carries offset of script of the removed pastedowns. The gothic attachment is with white slit thongs, showing the suspension holes (upper arrow); lower arrow points to the sharp backed shoulder of the first quire (SG Cod. 85; from Szirmai 1992c).

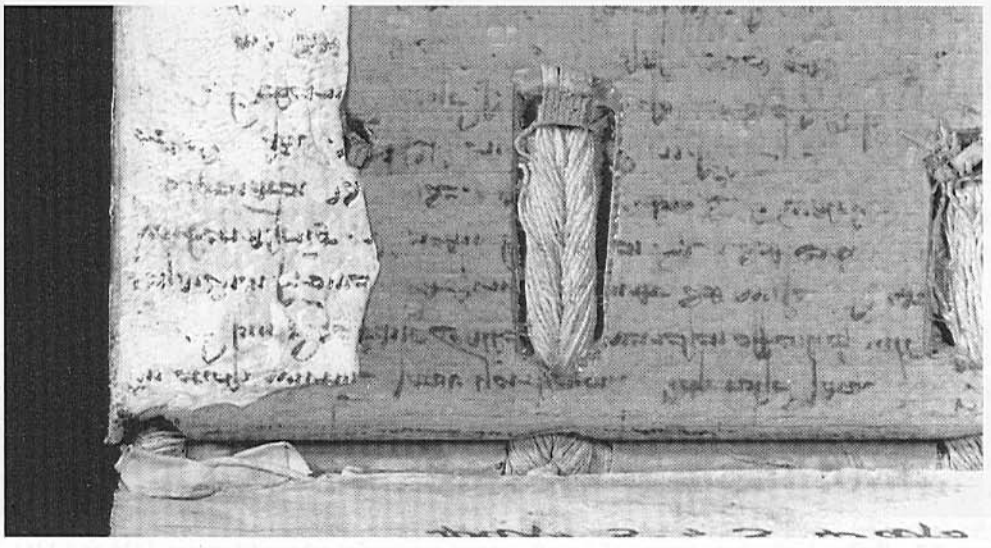

Figure 9.6 Sewing support from yarn twisted in opposite direction, gothic attachment fixed with a wedge. Note also the offset of the script left behind by the removed pastedown, the slight rounding of the spine edge of the board and the shoulder on the first quire (SG Cod. 930, paper manuscript, 1425).

Table 9.4 Sewing structures of gothic bindings

Group	*Herringbone*			*Straight*			*Total of bindings*
	Single	*Packed*	*Total*	*Single*	*Packed*	*Total*	
A: General	10	2	12	12	44	66	78
B: Zutphen Librije	–	–	–	12	24	36	36
C: St Gall rebindings	–	24	24	2	6	8	32
Total	10	26	36	26	74	110	146
Percentage	7.4	19.1	26.5	19.1	54.4	73.5	100.0

(1963 p. 16) thought that in England sewing on single thongs had been fully established by the middle of the sixteenth century. According to Gilissen (1983 p. 65), single white leather thongs had already appeared before the fifteenth century and gradually started to be replaced by vegetable cords from about 1450 onwards. Among 132 bindings from Southern France, Carvin (1988 p. 45) found only one case of single supports, dating from the end of the fifteenth century.

It should be noted that in the three bindings listed in Table 9.3 single cords alternate with double cords; all three bindings originate from Germany (one is illustrated by D.-

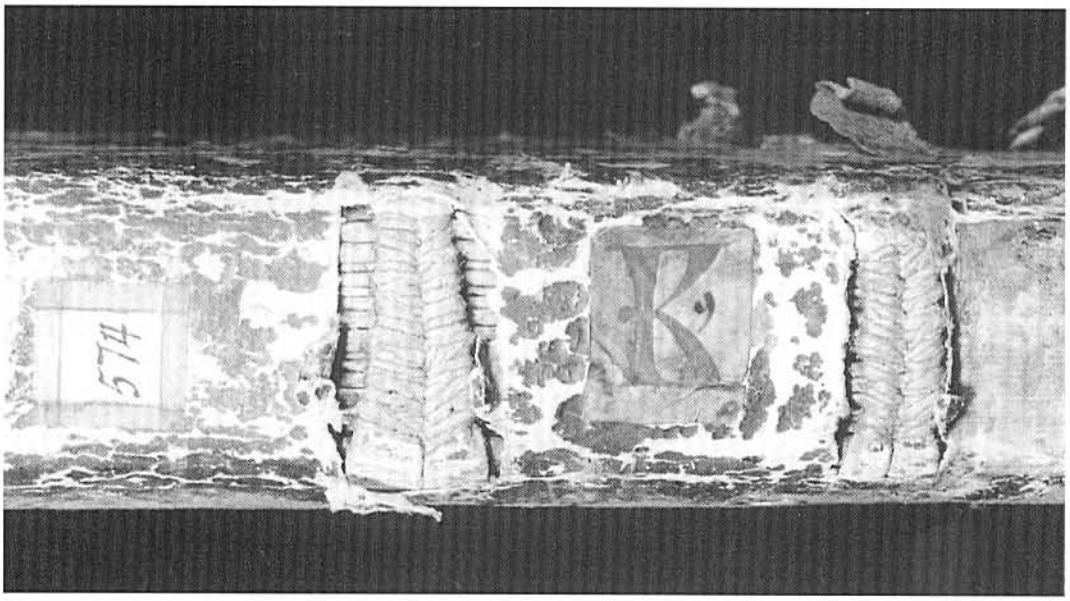

Figure 9.7 Packed herringbone sewing of a ninth-century manuscript rebound between 1436 and 1461. The textblock consists of 16 quires, while there are 25 loops on the exposed slit thongs. Note the signature label K 9 dating from before 1461 (SG Cod. 574, Cassianus' Collationes Patrum, listed in both the ninth-century and 1461 catalogues).

E. Petersen 1975 p. 11, HAB Cod. Guelf. 75.9. Aug. 2°, from 1457). The use of alternating single and double cords is also known in bindings made by the Nuremberg Dominican monk Forster in 1455 (Bock 1928; Kyriss 1940), as well as in two further bindings from Southern Germany, BSB Clm 12518 and 16056 (s. xiv and xv), recorded by Jäckel (1974). These examples could be the predecessors of the later practice of alternating single and double raised bands, typical of many sixteenth-century Italian bindings, yet their single bands are usually false. The earliest false bands I noted however, are on a German binding from 1442, bound by the Carthusians of Buxheim (Amsterdam UB XII E 24).[19]

The identification of the sewing structure requires visibility of both the spine and fold pattern; this condition was fulfilled on no more than one third of all gothic bindings studied (see Table 9.4), a sample too small to allow any definite conclusion. Herringbone sewing was found in about a quarter, notably many of the 'packed' type: a rather clumsy structure, since repeated linking under the previous sewing produces a rather irregular pattern; it was found frequently in the St Gall rebindings (Figure 9.7). Herringbone sewing was prevalent especially in English bindings (eight out of 12 instances); it was absent in Group B. Straight packed sewing had become the method of choice by the middle of the fifteenth century, without apparent geographical preference; the earliest occurrence in Group A was in a paper manuscript from 1396 (SG Cod. 316).

In general, the sewing structures involve a regular link-stitch type of change-over, never a simple span. However, in 22 cases of Group A the link-stitch change-over ('kettle') is absent: these are instances of integral sewing, already encountered in romanesque bindings (see section 8.5, Figure 8.7[a]). Twelve bindings with integral sewing come from the Lake Constance area, seven from Southern Germany, the remainder from Northern Germany and Austria. Figure 9.8 shows four variants of integral sewing, [a] and [b] being the most common. One-third of the 22 cases observed are resewings, as indicated by redundant sewing holes.

Yet, integral sewing was certainly not only practised for rebindings, but used as a proper method of sewing, as attested for Germany. Rhein's description (1942b) of 24 Saxon incunabula of Erfurt WAB matches indeed with the two types [a] and [b] in Figure 9.8. A further eight thirteenth- and fourteenth-century bindings from various monasteries in Saxony are added to this list (Säuberlich 1979). With type [b], the endband support will remain hidden under the covering, perceptible as a raised band; in type [a] the endband is usually visible (for its structure see below).

The integral sewing in Figure 9.8[c] is rather exceptional: its endband supports are, in fact, worked in one operation with the textblock sewing, but with a link-stitch between the two outmost sewing stations. Only a few cases of integral sewing of this type have been established with certainty: SG Cod. 581, a rebinding of a fourteenth-century parchment manuscript, and the now restored incunable Leiden UB 1370 G 35 of 1484 (see note 14). Apparently, Gilissen (1983 p. 19, Fig. 6) saw this type of integral sewing on several occasions in the course of restoration, but fails to give further details. Type [d] is another unusual variant: it is an integral sewing inasmuch as the sewing thread enters the subsequent quire at the outermost sewing stations; however, they are so far away from the edges that a primary endband has been added for consolidation.

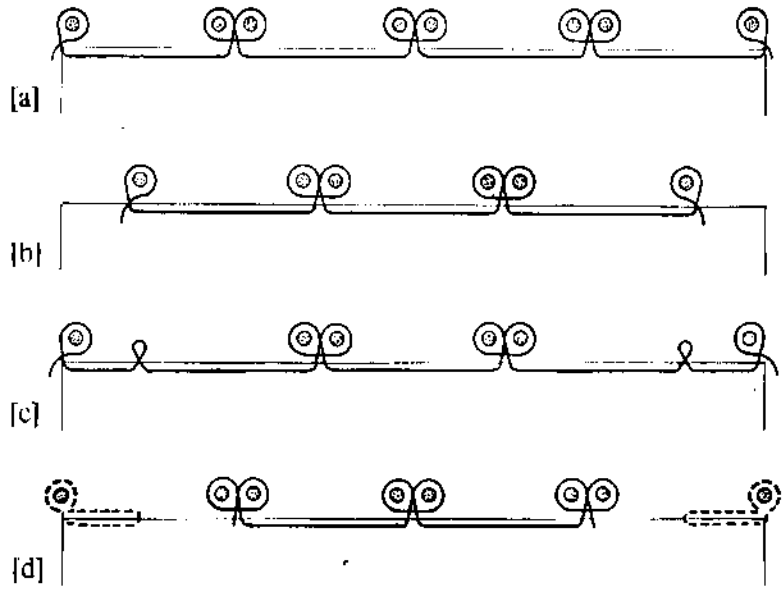

Figure 9.8 Variants of integral sewing: [a], the outermost supports are placed immediately on the edge; [b], outermost supports are set back from the edge by 5 to 25 millimetres; [c], change-over takes place at the outermost stations and not at the link-stitch sewing (SG Cod. 581, s. xiv, rebound later); [d], a primary endband is added (SG Cod. 335, paper manuscript from 1446).

Sewing without a link-stitch change-over ('*Fitzbund*') was already noticed by Gottlieb (1910 col. 71–3) on several fifteenth-century rebindings from Southern Germany; in one of them, a cuir-ciselé box binding (ÖNB Cod. 919), he found unused change-over holes of an earlier sewing. Gottlieb's observations fit in with my impression that integral sewing was often used on rebindings when no trimming was required: time was saved by working the endbands in one operation. Although Carvin (1988 pp. 50–1) mentions sewing without link-stitch change-over ('*pas de chainette*'), he does not provide further details which would allow us to identify the particular type.

The above findings suggest that integral sewing could have been used as a time-saving measure. My search for other 'short-cut sewings', that is, methods to speed up the process, was hardly rewarding: only two instances of 'bypass sewing' were observed (Figure 9.9). In one case, Libr. M 364 (printed 1567), double cords were worked alternately, that is, the even stations in one quire, the uneven stations in the next, [g]; in Libr. M 373 (from 1600), the left part of the double cord was worked when sewing one quire, the right part with the following quire, [h]. These scarce findings might indicate that short-cut sewings were not widely used before *c.* 1600; this would fit with the observations of Middleton (1963 pp. 20–4) and Guasti and Rossi (1982 pp. 44–50) who reported these labour-saving sewings first on bindings from the middle of the seventeenth century. However, further research could shift these dates: Middleton 1988 pp. 301–3 noted a bypass sewing with single thongs on a binding from 1553, and a 'two-on' sewing on one from 1603. For France, Pickwoad (1995) ascribed the earliest use of bypass sewing to the 1550s and of two-on

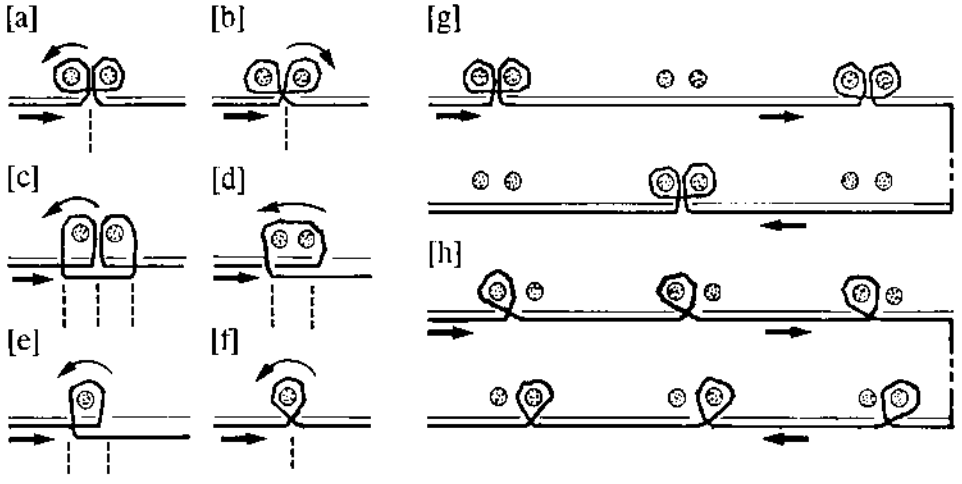

Figure 9.9 Various patterns of thread movement around double and single sewing supports in gothic bindings. The most common variants of sewing on double supports are [a] and [b] with a single sewing hole; [c] has three holes and makes for a closer adherence of the supports to the quires; [d], the double support is treated as a single support using two holes; [e] and [f], single supports which are worked with two and one hole respectively; [g] and [h], common sewing patterns on double supports using short cuts to speed up the process.

sewing only a decade later. During restoration work, sewing on double supports worked as if single (Figure 9.9[d]) and two-on sewing was observed on Antwerp imprints from 1553 (Nijmegen UB P.Inc. 13 and P.Inc. 98, both a Vorsterman Bible; see note 14). The notebook of de Bray (1658 pp. 35–7) describes both the bypass and the two-on sewing; Zeidler (1708 pp. 71–2) refers to the latter as '*falsch geheffter*' and is hopeful that the glue will make up for the weakness of the sewing ('*und muss der Leim hernach das beste dabey thun*').[20]

* * *

The tight spine of most gothic bindings interfered greatly with a detailed examination of the sewing thread, so that its diameter could only be determined in 152 of the total 410 cases. The values obtained are: Group A, mean = 0.74 mm, *s.d.* 0.31, range 0.4 to 1.3 mm; Group B, mean = 0.58 mm, *s.d.* 0.17, range 0.4 to 1.0 mm; Group C, mean = 0.87 mm, *s.d.* 0.20, range 0.5 to 1.4 mm. In view of the considerably wide range of the figures, the effect of the time factor was tested. For Group A, with the borderlines 1450 and 0.75 mm diameter, the chi-square test showed that thinner threads prevailed significantly in the later bindings ($\chi = 6.5$); for Group B, with the parameters 1540 and 0.6 mm, the prevalence of thinner threads in the later period was even more evident ($\chi = 13.6$). Furthermore, there was in Group A an apparent preference for the use of thick thread (over 1.2 mm) with paper manuscripts, whereas those of incunabula ranged between 0.6 and 0.7 mm. The conclusion can be drawn, though only tentatively in view of the small sample, that thinner sewing thread was preferred in later periods, notably for printed material. Group C was not tested in this respect, since the bindings were made within a short period of 25 years (1436–61). Some further details on the thread diameter are given in Table 9.6 (see section 9.5).

Table 9.5 Final twist and structure of the sewing thread in gothic bindings

Group	*Final S-twist*				*Final Z-twist*				*Total of bindings*
	Single-ply	*Re-plied*	*Unknown*	*Total*	*Single-ply*	*Re-plied*	*Unknown*	*Total*	
A: General	37	3	14	54	2	13	49	64	118
B: Zutphen Librije	23	1	60	84	1	1	1	3	87
C: St Gall rebindings	30	2	14	46	1	6	7	14	60
Total	90	6	88	184	4	20	57	81	265
Percentage	48.9	3.3	47.8	100.0	4.9	24.7	70.4	100.0	–

The final twist of the sewing thread could be identified in 265 of the 410 cases, while the structure was determinable in only 121 cases. The results are listed in Table 9.5. They show that, in contrast to carolingian and romanesque bindings, the S-twist and single-ply type of sewing thread predominates. Chronology seems to play a certain role: in the predominantly sixteenth-century Librije Group B only two cases of re-plied thread were observed, in contrast to the other earlier groups. More than half of the single-ply types are composed of two yarns, one third of three yarns, the remainder of up to seven; the single-ply types tend to be thinner in diameter than the re-plied types, particularly the S-2z type in Group B (0.4 to 0.6 mm). Of the total of 26 re-plied threads, 14 are of the type Z-2s-2z, two of the type S-2z-2s and the others of S-2z-3s, S-2z-4s, Z-2s-3z and Z-2s-4z. These findings clearly point to a development towards using cheaper and weaker threads, as especially apparent in Group B, where the most frequently broken sewings had used S-2z threads of 0.4 to 0.6 mm diameter.

The material of the sewing thread was determined with the drying-twist test on a small number of samples in Groups B and C.[21] All 11 samples of Group C tested positive for hemp, in contrast to the exclusive occurrence of flax in the original carolingian St Gall bindings (see section 7.4). From 27 samples of Group B, hemp was found in 22 cases, flax in five. These figures are too small to allow any conclusion; yet, they may show that both flax and hemp were employed on the Continent by the fifteenth century.[22]

9.5 SPINE TREATMENT

The above data indicate that weak sewing structures and low qualities of sewing threads were among the first signs of decreasing standards. Apparently binders tried to compensate for any shortcomings of the sewing by consolidating the spine with animal glue: its application contributed to holding the backs of the quires together and for attaching the leather or parchment pieces of spine lining. The time of introduction of the practice of gluing up the spine still remains a matter of conjecture. Faust (1612) describes it for both limp parchment bindings (p. 57) and wooden-board bindings (pp. 73–5) and advises on the glue to be

Figure 9.10 A water-colour drawing in Dirk de Bray's manual of 1658, illustrating the binder gluing up the spine, with the steaming glue pot in the background, while a young apprentice is busy on the sewing frame. Reproduced from the original in Haarlem GA (MS 201, f. 7).

hot in order to fix the parchment linings firmly. De Bray (1658 pp. 9–10) instructs us in detail: first apply a thin layer over the spine, rub the glue between the quires with a hammer, apply another layer, attach the parchment linings and apply over them a third layer of glue; he provides a charming illustration of the rather harsh treatment the book had to undergo (Figure 9.10). Adam (1927 p. 110) assumes that glue had not been employed before the middle of the sixteenth century and that it had come into the realm of the binder through its use for sizing paper (see section 9.3). Middleton (1963 p. 54) did not notice glueing in England until the early part of the sixteenth century. The reference to a binder's note in a manuscript from 1352 as evidence for the earliest use of glue (Pollard 1976 p. 52 note 2) is incorrect: it is a rebinding from the late fifteenth century.[23]

It is virtually impossible to determine only with the naked eye whether or not adhesives had been used, since they may have been completely degraded by biological agents: remnants like a powdery residue of starch paste or brittle particles of aged glue may have become lost due to the spine movement.[24] Since animal glue was often used in later periods to patch up a loosened spine, its presence is not necessarily proof of its original use. I found unequivocal evidence for the original use of animal glue in at least half of the

130 St Gall rebindings of parchment manuscripts (Group C), dating from between 1436 and 1461.

But not all gothic bindings display the new fashion: in Groups A and B a number of bindings showed no evidence of ever having been treated with animal glue. In Group B at least 25 of the 110 bindings exhibit this feature: no traces of glue, only some white dust, possibly residues of paste, covered the flesh side of the back covering. Middleton (1963 p. 54) noted on bindings from the second half of the sixteenth century that some binders did not glue up the spine, but rather did apply paste. Most bindings (*c.* 35 per cent) in the Librije Group B, whose spines had not been glued up, share another peculiarity: they have no spine lining, and there is no evidence that they ever had any. This is also true of *c.* 10 per cent of the bindings in Group A, whereas virtually all bindings in Group C do have spine lining. These are obvious differences, but it seems too early to interpret them in terms of local traditions or purposeful efforts of individual binders.

Another purpose for using animal glue could have been to give some permanence to the rounded shape, obviously considered a desirable structure. With the semi-quantitative method described earlier (see section 7.10, Figure 7.33[a]), it became apparent that the majority of gothic bindings have a pronounced rounded spine (Figure 9.11), in contrast to the carolingian and romanesque bindings with their flat or concave spines (see Figure 7.33[b]). Only about 10 per cent of the spines of gothic bindings, exclusively manuscripts on paper or parchment, have flat or concave spines; all bindings containing printed works have a convex spine.

The physical principle behind the rounding of the spine seems to be simple: the sewing thread in the centrefolds increases the width of the textblock at the spine, a phenomenon known to the binder as 'swelling'. On gently pressing the spine, the increased width will escape compression by spontaneously assuming a convex shape and even forming shoulders if the inner profile of the boards is shaped appropriately. Various experienced binders have indeed conjectured that the shoulders of old bindings have naturally taken on

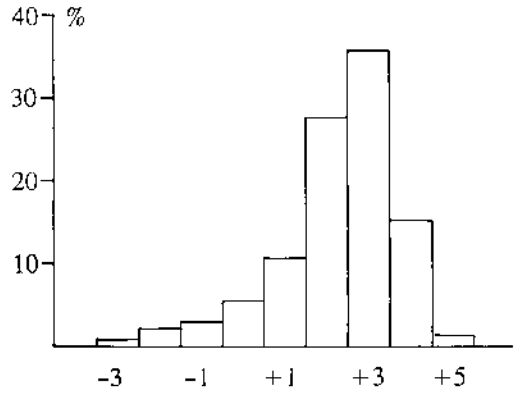

Figure 9.11 Histogram showing the rating of spine shapes of gothic bindings (345 cases, combined data of Groups A, B and C). Figures with minus signs represent increasing concavity, zero stands for flat, plus signs for increasing convexity.

Table 9.6 Factors of possible influence on the spine shape of gothic bindings. The figures are mean values (standard deviation between brackets) of the number of cases. For comparison, the corresponding data of the original St Gall carolingian bindings (see Chapter 7) are included

Group	*Number cases*	*Thread diameter (mm)*	*Thickness of quires (mm)*	*Number of quires*	*Spine shape rating*
A-1: MSS on paper	24	1.12 (0.37)	2.28 (0.26)	17.0 (5.15)	+2.98 (0.90)
A-2: MSS on parchment	32	0.67 (0.18)	2.03 (0.34)	19.4 (9.20)	+2.61 (1.02)
A-3: Printed works (paper)	16	0.60 (0.19)	1.22 (0.18)	37.3 (9.10)	+2.44 (1.09)
B: Librije (printed, paper)	18	0.59 (0.19)	1.26 (0.47)	46.1 (15.7)	+2.92 (0.77)
C: St Gall MSS (parchment, rebound)	45	0.86 (0.20)	1.83 (0.35)	21.0 (5.45)	+2.32 (0.86)
St Gall MSS (parchment, carolingian)	95	0.77 (0.14)	1.84 (0.31)	19.9 (7.61)	−1.84 (1.30)

their shape (Rhein 1943); Powell strongly defended this view and argued that 'There is no doubt in my mind whatever that [. . .] the only rounding and backing was achieved by lacing the boards on very tightly and shutting them on the text' (cited by Middleton 1963 p. 59; see also Middleton 1988 p. 305). Powell's explanation seems to hold for works printed on paper, but is unlikely to be valid for parchment manuscripts. The cockling of parchment leaves is likely to compensate for the effect of swelling (Adam 1916b; Middleton 1963 p. 59). But the contribution of the sewing thread may also be different: the early threads were soft and compressible and are likely to have caused less swelling.

In an attempt to uncover any interrelationship between parameters like the thread diameter, material and thickness of the quires in affecting the spine shape, data were collected in a series of bindings of Groups A, B and C, and compared with corresponding data on original carolingian bindings from St Gall (Table 9.6). Calculations of correlation were inconclusive, yet certain trends are apparent: while paper manuscripts have very thick quires and are sewn with the thickest threads, paper imprints consist of the thinnest quires and are sewn with finer threads. However, spine rounding does not appear to be interrelated with thread diameter or any other parameter, which becomes strikingly evident when the data on gothic bindings of parchment manuscripts are contrasted with the corresponding data of the original carolingian bindings: the comparison of the last two lines of Table 9.6 reveal that all features but the hollow spine are essentially similar.

The question arises as to why the spines adopted the rounded shape in the fifteenth-century rebindings but not in the earlier original carolingian bindings. The only plausible answer is that the spines of the fifteenth-century rebindings did not acquire their shape spontaneously, but through some mechanical intervention. Two pieces of evidence support this assumption. First, in about one third of the rebindings (Group C), and occasionally in Groups A and B, sharp shoulders, sometimes approaching a right angle, are

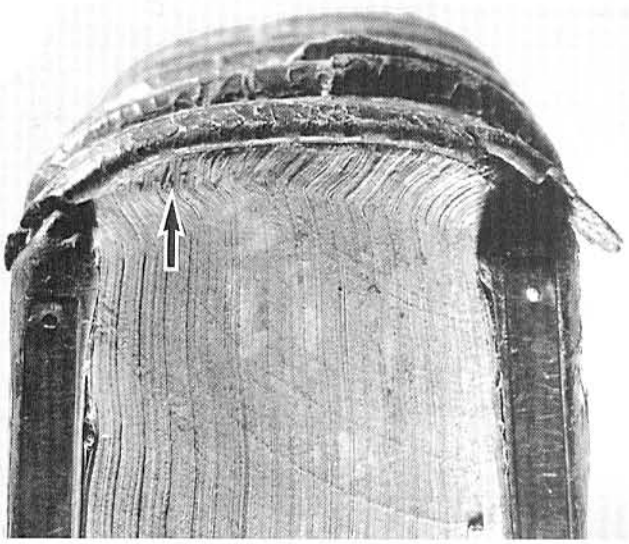

Figure 9.12 Marks of the backing hammer, hitting the spine the wrong way (arrow). Note the slightly curved stroke marks of the drawknife (Libr. M 177, Basle imprint from 1521).

encountered together with boards that have only a slight inner bevel; the earliest examples are the manuscripts SG Cod. 813 (on paper, dated 1410) and SG Cod. 794 (parchment, dated 1422). Such unexpected incongruity of the profile of the shoulder and inner board bevel is incompatible with the assumption that the shoulder shape was the result of a spontaneous process. Furthermore, there is evidence that the bookblock had been held compressed and the shoulder tapped over with a hammer or some other tool, a process designated as 'backing' by the modern binder. The evidence consists of marks in the form of wrong-sided bends of the quires near the spine, discernible on the head and tail edge and obviously the result of inadvertently hitting the spine with the backing hammer from the wrong direction. Apparently such accidents happened even in medieval workshops, providing us with valuable evidence (Figure 9.12). I have observed such marks in 16 out of the 410 bindings studied. Among the earliest examples are several rebound parchment manuscripts (Group C, 1436 to 1461), a paper manuscript dated 1461 (SG Cod. 797) and a 1486 incunable (Amsterdam UB Inc. 69). Although a spontaneous moulding into a rounded shape cannot be excluded and might have happened at times, the evidence of mechanical intervention found in so many instances suggests that rounding and backing was a desired objective.[25]

* * *

Attaching linings of parchment or leather was seemingly the last step of the spine treatment. Linings are present in the majority of the 410 gothic bindings studied, but only 164 were accessible enough to determine their material and structure. In almost all cases the lining

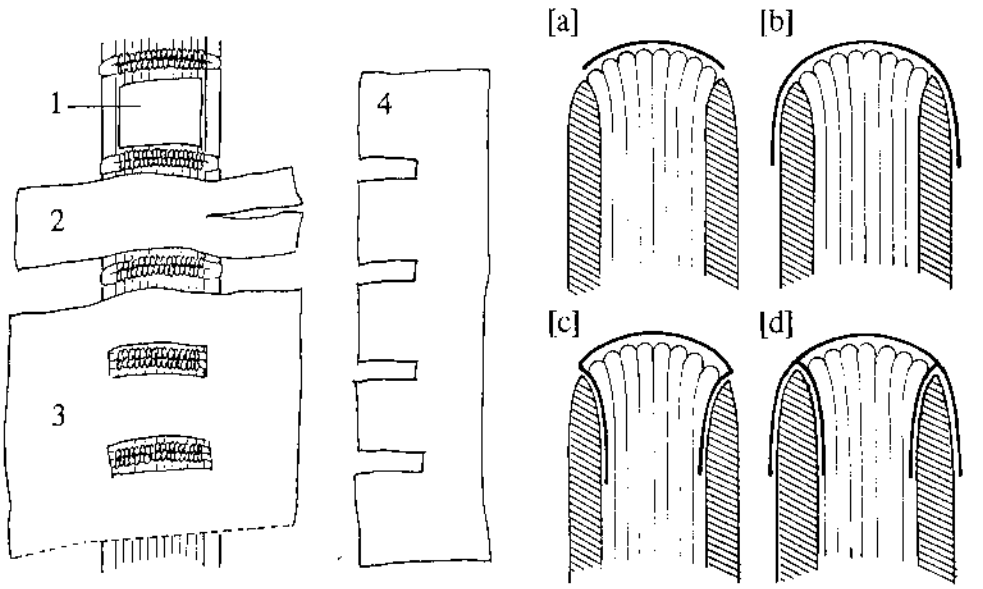

Figure 9.13 Various types of spine linings: (1), patch lining; (2), transverse lining; (3), slotted lining; (4) comb lining. Patch linings are glued down within the spine width [a]; transverse linings as well as slotted and comb linings extend onto the outer [b] or inner [c] face, or either face if the extensions are slit [d].

consists of separate pieces stuck between the supports; they are either of the patch type, restricted to the spine width, or transverse strips left long enough to extend partially over the boards (Figure 9.13[1] and [2]). The transverse linings can be glued down either on the outer [b] or the inner [c] face of the boards, or alternatingly on either face if the extensions are cut into half [d]. Alternatively, the lining may be made of a full-length strip with pieces cut out that correspond to the supports and leave them uncovered (slotted lining, [3]). Finally, the lining may consist of two so-called comb linings which overlap each other on the spine [4].

Table 9.7 summarizes the data on the material and structure of linings observed (excluding two cases of comb linings). The figures allow only tentative conclusions: in Groups A and C (predominantly fifteenth century) about one quarter of the linings is of leather (mostly of chamois and a few of pigskin), the majority of the linings being of the transverse type extending over the outer face of the board; the prevalence of leather linings on bindings bound before 1450 is significant in Group A (chi-square test, $\chi = 4.6$). In the Librije Group B all linings are made of parchment, often narrower than the area between the supports, and fixed to the inner face of the boards; one third of the bindings examined have no lining.

In the literature, soft chamois linings have been observed as characteristic for the workshop of the Cistercian Abbey of Neuberg (Austria), active between *c.* 1375 and 1450 (Laurin 1961). Carvin (1988 pp. 87–9) found linings in only 35 out of 132 French bindings, of which seven or eight were transverse linings of leather and about another 12 of

Table 9.7 Patch- and transverse linings on gothic bindings (extension glued to outer [O] inner [I] face of the board)

Group	*Leather*				*Parchment*				*None*	*Total of bindings*
	Patch	*Tr.[O]*	*Tr.[I]*	*Total*	*Patch*	*Tr.[O]*	*Tr.[I]*	*Total*		
A: General	4	5	7	16	5	31	17	53	7	76
B: Zutphen Librije	–	–	–	–	–	–	26	26	14	40
C: St Gall rebindings	–	17	–	17	–	28	–	28	1	46
Total	4	22	7	33	5	59	43	107	22	162
Percentage	12.1	66.7	21.1	100.0	4.7	55.1	40.2	100.0	–	–

parchment. My finding of the earliest parchment lining on a thirteenth-century binding (Cambridge UL Add. 7220, a Psalterium from the Augustine priory of Campsey) agrees with Vezin's (1984) observation on Bodley Bodl. 807 dating from the same period. Vezin gives as the earliest exactly dated example of a parchment lining, BNF MS lat. 16152 from 1407; as the earliest cloth linings he cites BNF MS lat. 9636, dated 1415, the extensions in both cases having been glued to the outer face of the boards. The only cloth lining in my own studies occurs in a volume from the Carthusians of Buxheim dated to 1454 (Cambridge UL Add. 6981); the cloth patches are additionally covered with parchment strips extending over the outer face of the boards. Whereas the notebook of de Bray (1658) mentions parchment only as lining material, Zeidler (1708 p. 78) suggests cloth as an alternative (and castigates the French for using paper linings).

Whether the binder had affixed the extensions of the transverse linings onto the inner or outer face of the boards would have probably depended on when he would have attached the boards. If the lining had been applied after board attachment, the extensions were conveniently affixed onto the outer face; if applied before board attachment, fixing the extensions to the inner face would have been more likely. In either case the rationale is evidently to improve the board attachment and reinforce the joints. Due to the enlarged area of adhesion, this effect becomes enhanced with comb linings and those of the slotted type (see Figure 9.13) a technical advantage already recognized by Gottlieb (1910 col. 17).[26] Comb linings seem to have been favoured by Italian and French binders (see for its description and illustration Dudin's 1772 manual, pl. IX, figs 7–10). Carvin (1988 p. 88) describes this type of parchment lining in seven out of 35 cases of French bindings.

The variant of transverse linings with their incised extensions adhering alternatingly onto the inner and outer face of boards (Figure 9.13[d]) serves the additional mechanical purpose of preventing the boards from slipping backwards. This function was conjectured by Levy (1987; 1989) in an incunable bound in Nuremberg in a workshop active between 1478 and 1515 (Kyriss 1951–8 vol. 2, p. 97, workshop no. 118). As that binding has no shoulders and the boards have no inner bevel (like the Corvinus bindings and many Italian

bindings), Levy considered this method of attaching the transverse linings as very advantageous.

9.6 EDGE TRIMMING

Having consolidated the spine with glue the binder would proceed to trim the bookblock, which he performed either with the drawknife or with the newly introduced plough. Usually the use of a drawknife, as already applied on carolingian and romanesque bindings (see Chapter 7, note 13, section 7.6, Figures 7.19 and 7.20 and section 8.7), is indicated by irregular score marks on the edge of the bookblock. Sometimes the binder succeeded in obtaining a smooth surface with barely visible marks (see Figure 9.12), but many edges testify that it must have been a hard struggle (Figure 9.14).

The binder's plough, a novel device for edge trimming, is based on a sounder principle: it can be compared with cutting the edges of a pile of leaves, tightly held under a ruler, with repeated strokes of the knife taking away a few snippets at a time. In the binder's plough, the knife is fixed at the bottom of one of two wooden blocks, connected with a wooden screw by which their distance can be altered (Figure 9.15[a]). For trimming the bookblock is tightly compressed in the press, with the edge to be trimmed slightly protruding; the plough rides back and forth on the press and at each forward stroke the wooden screw of the plough is slightly turned, which draws the knife deeper into the bookblock edge, removing snippets of perhaps one millimetre width at a time.

It is not known when and where the plough was invented; its first representation is in a woodcut of the interior of a bindery by Jost Amman from 1568. The earliest documen-

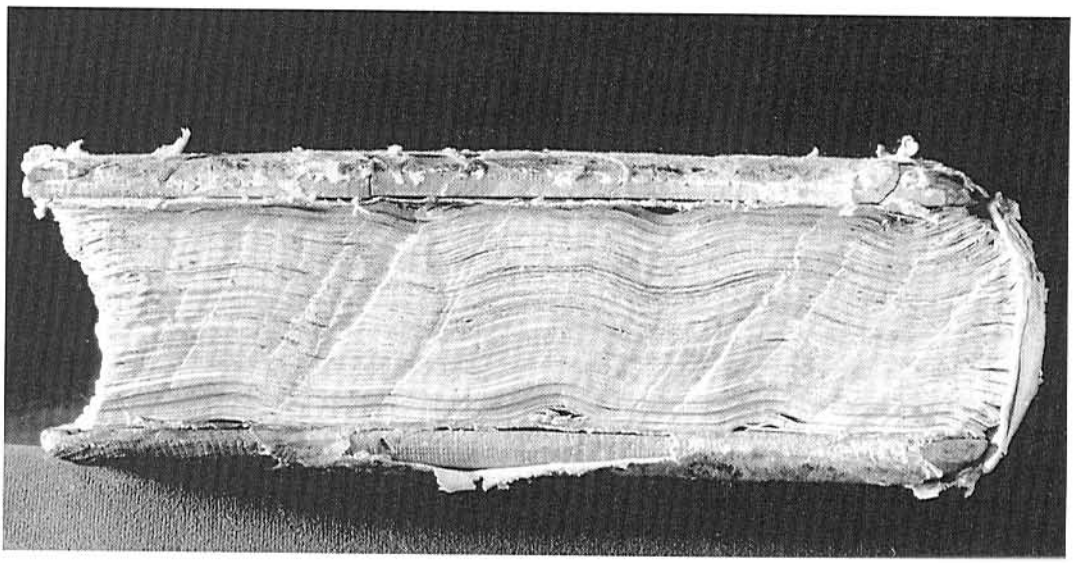

Figure 9.14 Head edge of a paper manuscript (dated 1465) showing score marks caused by the drawknife (SG Cod. 1077).

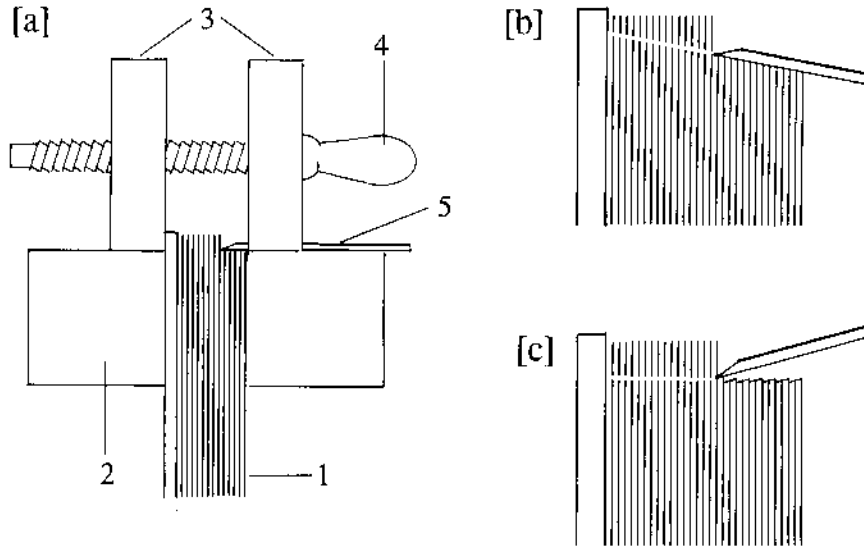

Figure 9.15 Trimming the edge by the binder's plough: [a], cross-section showing the book (1) in the lying press (2), the two wooden blocks of the plough (3) with the screw handle (4) and the knife (5); [b] and [c], ill-adjustment of the knife with upward [b] or downward inclination [c], the latter producing characteristic ridges.

tary evidence so far is a Nuremberg inventory from 1530, recording '*zwei Beschneidehobel*' (Helwig 1941); 'a plowghe' as well as 'a cutting Knyff' are listed in a Cambridge binder's inventory from 1545 (Gray and Palmer 1915 p. 27; see also Middleton 1963 pp. 215–16 and 245). The earlier type of the plough, described and illustrated in de Bray (1658) and Prediger (1741–53), has a circular knife; Zeidler (1708) mentions a narrow pointed knife, which was apparently introduced and is the only type given in the French manual of Dudin (1772). The circular knife had the advantage that, when becoming blunt, a small turn of the knife provided a new sharp bevel without the need of readjustment.

The adjustment of the plough knife is rather critical and the matter has been treated in great detail in the manuals of Zeidler (1708) and Prediger (1741–53), describing the marks left behind by a blunt or ill-adjusted knife. It is essential that the plane of the knife is exactly parallel to the cheeks of the press: if the knife point is slightly raised, the cut edge will be smooth but askew (see Figure 9.15[b]); if it points downward, ridges will be formed after every stroke, [c]. Apparently some binders did not take enough pains to level the knife so that many edges became blemished with such ridges, which gives us today valuable evidence of the plough's use.[27] These ridges can be detected particularly well on the head and tail edges, where they run across the boundaries of the quires (Figure 9.16[a]). The ridges arise when the point of the ill-adjusted knife passes the shoulders of the heavily compressed bookblock, [b]; upon relaxing the press, the bookblock resumes its original thickness and the straight ridges left by the knife become curved, [c]. Such score marks have been noted by Zeidler (1708 p. 87: '*lauter Schandflecke*') and Prediger (1741 vol. 1 p. 45) was annoyed when the edge showed this blemish ('*hinten das Capital so übel eingekerbet ist*'); in the contemporary literature this phenomenon is described by Cains (1984).

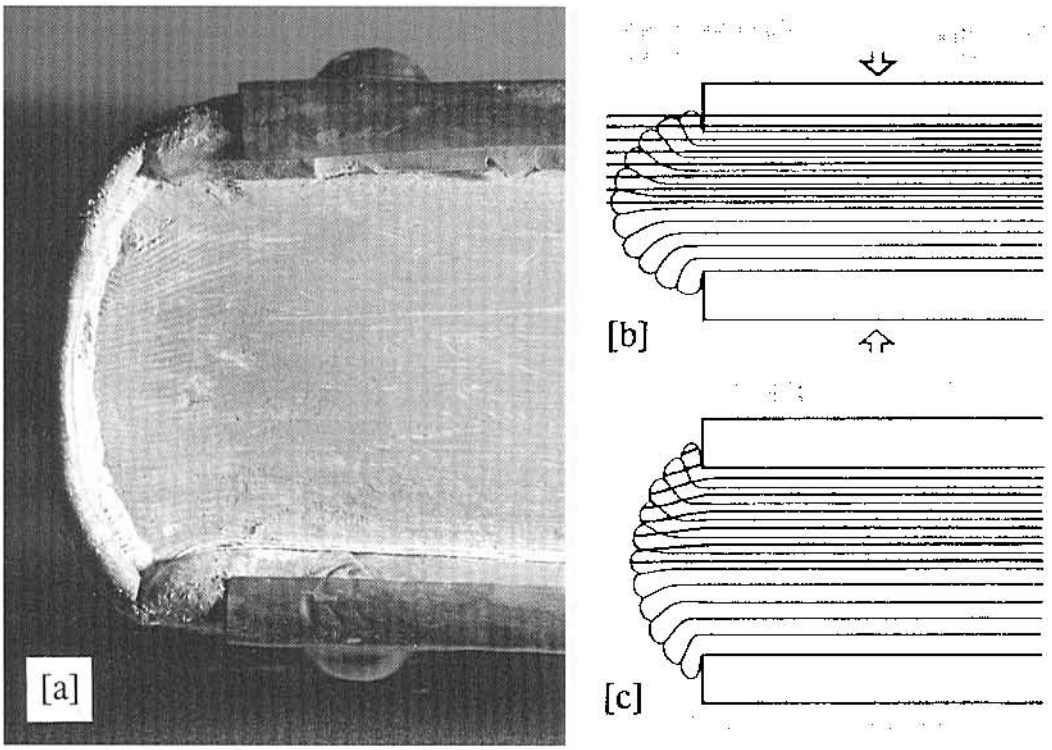

Figure 9.16 Score marks of the plough: [a], photograph of the score marks on the head edge of Libr. M 333 (imprint of 1591); [b], diagram showing the straight ridges (shown as heavy lines) caused by the passage of the knife during trimming in the press; [c], after release from the press, the initially straight ridges become bent and appear crossing with the quire boundaries, especially close to the shoulders.

Examination of the edges for score marks can reveal what method of trimming had been employed; lack of score marks may indicate that the binder did a perfect job, but they also might have been removed by scraping or polishing, or covered up with some decoration. Score marks could be recognized and identified in slightly more than half of the bindings studied (Table 9.8). The St Gall rebindings (Group C) showed the exclusive use of the

Table 9.8 Score marks caused by edge trimming in gothic bindings (percentages in brackets).

Group	*Drawknife*		*Plough*		*No marks*		*Total*
A: General	66	(38.8)	2	(1.2)	102	(60.0)	170
B: Zutphen Librije	21	(19.1)	46	(41.8)	43	(39.1)	110
C: St Gall rebindings	84	(64.6)	–	–	46	(35.4)	130
Total	171	(41.7)	48	(11.7)	191	(46.6)	410

Knihovna benediktinského opatství v Rajhradě

drawknife; in Group A, also predominantly fifteenth-century material, the use of the drawknife was also clearly predominant, yet the first plough marks were recorded here on a 1482 German paper manuscript (Tübingen UB Mc 125). In the Librije Group (B) the plough was used twice as often as the drawknife; the earliest plough marks were on an incunable from 1498, the latest marks of the drawknife were on a volume from 1543 (respectively Libr. M 68 and M 142). These data indicate that the plough started to supersede the drawknife by around 1520–40, a date which accords with Middleton's (1963 p. 82) findings that in England 'the plough was not widely used before about 1520'.

Trimming with the plough required great care in positioning the book in the press and thus ensuring that the edges would be square. In order to have the first cut made at a right angle with the spine – usually at the head – the binder could have placed a L-square into the shoulder along the spine and drawn a perpendicular guideline to indicate the intended cut. But he could also have applied a more simple method, as described in Faust's 1612 manual (p. 74–5): the first endleaf is folded back on itself to fit the shoulder and it is pierced with a bodkin near the corner; on unfolding, the two resulting holes determine the perpendicular line for the cut. To make sure that the tail cut is made parallel to the head, equidistant points are made either with a bodkin using a tally or compass, or with a 'puncturing iron', a pointed rod with an adjustable stop; the latter is described by Zeidler (1708 p. 84) and Prediger (1741 vol. 1, p. 84; Table I, fig. A). Although such punctures were meant to be removed during trimming, sometimes they escaped the knife (Figure 9.17).

Similar guide-holes had been used for marking the fore-edge cut. Yet, before trimming the fore-edge, the already rounded spine had to be flattened temporarily by bouncing it on a flat surface or hitting it with a small hammer. The spine was retained flat by sticking sewing needles through the sewing supports or by tying small 'stretching sticks' ('*Spannhölzer*') to the supports, procedures described by de Bray (1658 p. 10), Zeidler (1708 p. 85) and Prediger (1741 vol. 1, p. 50–1). Alternatively the bookblock was tied up with a piece of string. In order to make sure that the fore-edge was parallel to the spine, the '*Sattel*' (saddle) was used, a sort of adjustable bridge, to check the height of the spine at the head and tail while protruding from the press (Zeidler 1708 fig. opposite p. 83; Prediger 1741 vol. 1, pp. 52–3; 1751 p. 47, table 5, fig. 9).[28] After releasing the press, the spine would spontaneously reassume its rounded shape and the fore-edge would form the corresponding concavity. But evidently not all binders followed this method and did not mind the rounded spine, which resulted in a flat fore-edge. I found such flat fore-edges in 23 cases in Group A, all coming from the Lake Constance area and constituting 38 per cent of the 60 bindings from this region. Yet flat fore-edges may also be the result of later refurbishing: this practice was observed and archival evidence provided by Streeter (1931 pp. 168–9) for Oxford around the 1600s.

To complete the discussion of the tools for trimming the edge, a rarely encountered device should be mentioned, namely the file. I noted its use on a fifteenth-century rebinding of an eleventh-century parchment manuscript (Figure 9.18). Marks of a file were observed by Adam (1923a p. 167) on a limp parchment binding from the fifteenth century. The file was apparently also used by oriental binders (Bosch and Petherbridge 1981, fig. 8).

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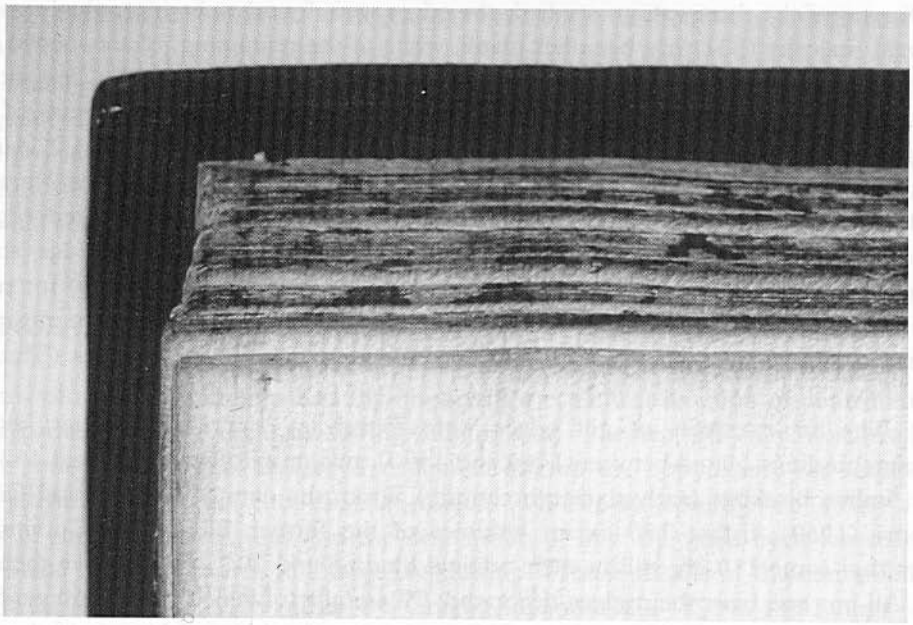


Figure 9.17 Punctured hole in the endleaf, which had marked the fore-edge cut, on an incunable from 1472 (HAB Cod. 158.3 Quod. 2°).

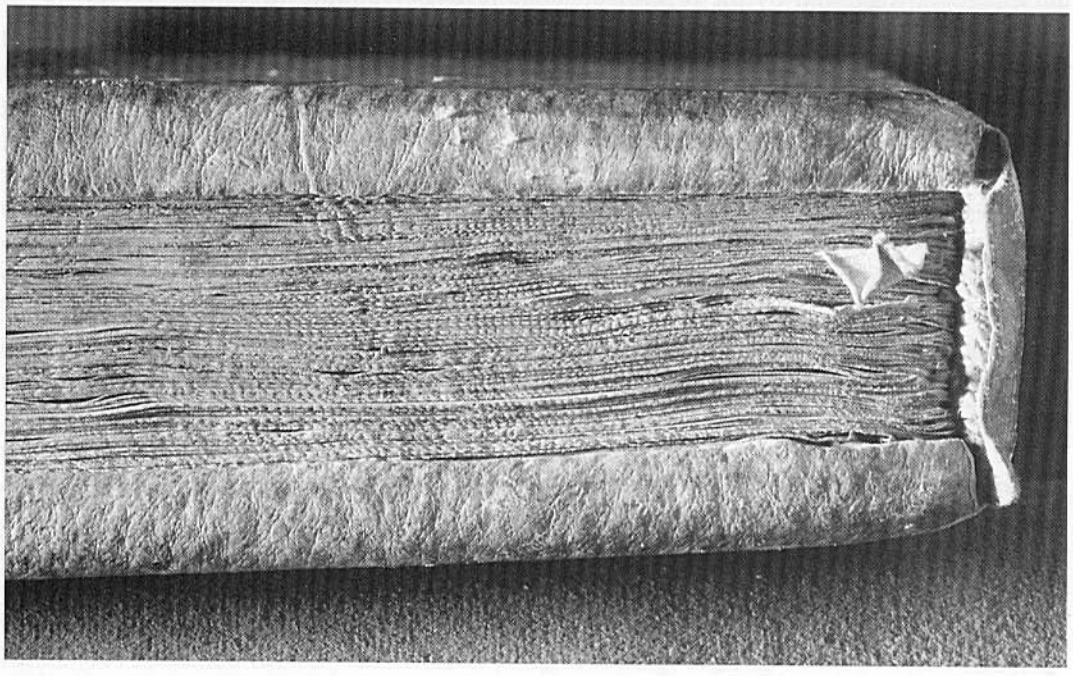


Figure 9.18 Score marks of a coarse file on the edge of an eleventh-century parchment manuscript rebound between 1436 and 1461 (SG Cod. 322).

In 380 cases of the three groups studied, the edges were found to be in original condition. The great majority (331) has been left blank, while of the remaining 32 are stained in one colour, 2 are painted with ornaments, 15 are gilt (12 of these gauffered). The most frequently occurring colour is yellow, sometimes red or blue. The earliest faint traces of yellow edges were observed on a paper manuscript from 1406 (HAB Cod. Guelf. 81.2. Aug. 2°). Kyriss (1940 p. 51) regularly noted stained edges on bindings from various Nuremberg monasteries of the second half of the fifteenth century. For medieval painted edges see Foot (1993). Faust (1612 pp. 105–9) specifies the pigments used for edge staining: orpiment (sulphide of arsenic) for yellow, cinnabar (red sulphide of mercury) for red and indigo for blue, made up with size or egg-white; for green he used a mixture of orpiment and indigo. These were all common painting materials in the Middle Ages (Thompson 1936).

The 15 examples of gilt edges were found on luxurious volumes: eight on Corvinian bindings (dated between 1465 and 1490), two on Groliers (1521 and 1527) and five on Italian bindings (early sixteenth century). From the data of Csapodi and Csapodi-Gárdonyi (1969), listing 180 extant volumes of the former Bibliotheca Corviniana, it appears that some 110 are still in their original binding and 104 of these have their edges intact. All but one have their edges decorated: 79 are gilt (of which at least 60 gauffered), 24 embellished with polychrome and gold ornaments, the latter rich type of decoration claiming to have originated from the Buda workshop.[29] Whether gilding was undertaken by painting or with gold leaf is not yet known. Gold leaf was very likely used for the gauffered gilt edges, as suggested by the brilliant metallic lustre.[30] I found the earliest example of a gilt and gauffered edge on a manuscript from 1462 (OSzK Cod. Lat. 370).[31]

Although the Corvinian bindings show very early examples of edge gilding, this technique had certainly not originated in Hungary but very likely came from Italy, where another early gilt edge was identified by Adam (1915) on a German incunable from 1481 bound in Venice by the 'Uggelheimer binder'. The first documentary evidence points to Naples: the accounts of the court of Aragon of 1481 record for 28 February a payment to Baldassarre Scariglia for seven luxurious bindings with a gilt edge (Gottlieb 1910 col. 9). De Marinis (1960 vol. 1, p. 4) gives further details of this account book entry, specifying the materials used, among others '*pani d'oro per fare fullagii interlazi alle coperte et innaurare li tagli delle carte*'. There are a few earlier references to edge gilding: Gay (1887 p. 1515) cites a payment in 1455 to the Blois binder Lubin de Boutillier '*pour avoir reliée unes Heures pour madame la duchesse, couvertes de cuir vermeil empraint et dorées sur tranche*'. Laffitte (1989) notes, in the 1411 inventory of the library of Charles V (1337–1380), an early recording of a Breviary with edges '*dorés à lozanges bezangées*'; this description would fit in with what could be the earliest instance of edge gilding, recorded by Gottlieb (1910 col. 66) on a Hebrew MS dated 1392, possibly from Austria.

A different kind of evidence can be seen on the famous altar-piece 'The Lamb of God' by the Brothers van Eyck, finished around 1432, in the St Bavo Cathedral of Gent; the books in the hands of John the Baptist and one of the singing angels show gilt gauffered edges rendered in admirable detail. They have a diamond (or lozenge) pattern with dots which Derolez (1985) described as the earliest type of such gilt edges in the fifteenth

century. Other examples of books with gilt gauffered edges in Flemish paintings have been noted by Foot (1993 p. 452).

Finally it should be mentioned that edges may carry the title of the book, written in ink or painted, or even gauffered. Although these titles are not necessarily contemporary, they do provide information on the way the books had been shelved: a title on the fore-edge might indicate upright shelving with the back to the rear, whereas a title on the head or tail edge would suggest that the volume had been stored flat on its side.

9.7 ENDBANDS

Endbands of medieval bindings had the important mechanical function of contributing to the board attachment like the main sewing supports and to protect the vulnerable head- and tailmost parts of the spine. Damaged endbands offered the opportunity for restorers to unravel them and to reconstruct them in models. We owe to Jäckel (1961; 1975) a large number of such reconstructions and the description of how they had been worked; Gast (1983) made his work known to a larger readership. Precise details of the construction of many medieval endbands are given by Greenfield and Hille (1986; 1990) and in *Les tranchefiles brodées* (1989), so we are reasonably informed about the technical details of most endband types.

Endbands can be made at different stages of the binding process: they can be worked in one operation with the sewing (integral sewing) or after trimming of the edges as primary wound endbands, which may either remain plain or receive a secondary embellishing before or after covering. On account of such differences seven main types are proposed: I, integral endband; II, primary wound endband; III, saddle-stitch endband over primary wound endband; IV, primary endband with secondary embroidery; V, primary wound endband with secondary braiding; VI, primary embroidered endband and VII, short-cut endband. All these types can exhibit many variants. The endbands of types I to V are always sewn on supports, usually single, the slips of which are laced through the boards; types VI and VII may also be laced in, but the supports are often reduced to a core only. Table 9.9 summarizes the findings on 346 bindings of the 410 studied; the remainder was either too damaged to be identified or was lost altogether, but clearly all bindings had originally been furnished with some kind of an endband.

As already explained, in integral sewing (see Figures 9.8 and 9.20) the link-stitch type of change-over is omitted, since the thread passes to the next quire at the head or tail edge, forming the integral endband, Type I. In this context it has also been mentioned that, in the past, it was repeatedly wrongly considered to be an ancient method, employed before edge trimming was practised (see Chapter 8, note 8). The fact is that integral endbands are unknown to carolingian bindings and only occasionally found on romanesque bindings, whereas on gothic bindings they seem to have become more frequent. Strangely enough, Jäckel (1975) denied the very existence of integral sewing, arguing that no decent endband could be worked that way, whereas 24 cases of integral endbands were described by Rhein (1942b) on incunabula from the Erfurt area.[32]

Table 9.9 Endbands on gothic bindings

Group	I*	II	III	IV	V	VI	VII	Total
A: General	15	44	16	29	19	12	11	146
	(10.3)**	(30.1)	(11)	(19.9)	(13.0)	(8.2)	(7.5)	(100.0)
B: Zutphen Librije	–	–	18	7	8	19	19	71
	–	–	(25.4)	(9.9)	(11.3)	(26.7)	(26.7)	(100.0)
C: St Gall rebindings	–	24	–	–	105	–	–	129
	–	(18.6)	–	–	(81.4)	–	–	(100.0)
Total	15	68	34	36	132	31	30	346
	(4.3)	(19.7)	(9.8)	(10.4)	(38.2)	(8.9)	8.7)	(100.0)

* Roman numerals indicate the following types: I, integral endband; II, primary wound endband; III, saddle-stitch endband; IV, primary wound endband with secondary embroidery; V, primary wound endband with secondary braiding; VI, primary embroidered endband; VII, short-cut endband

** The figures between parentheses are percentages

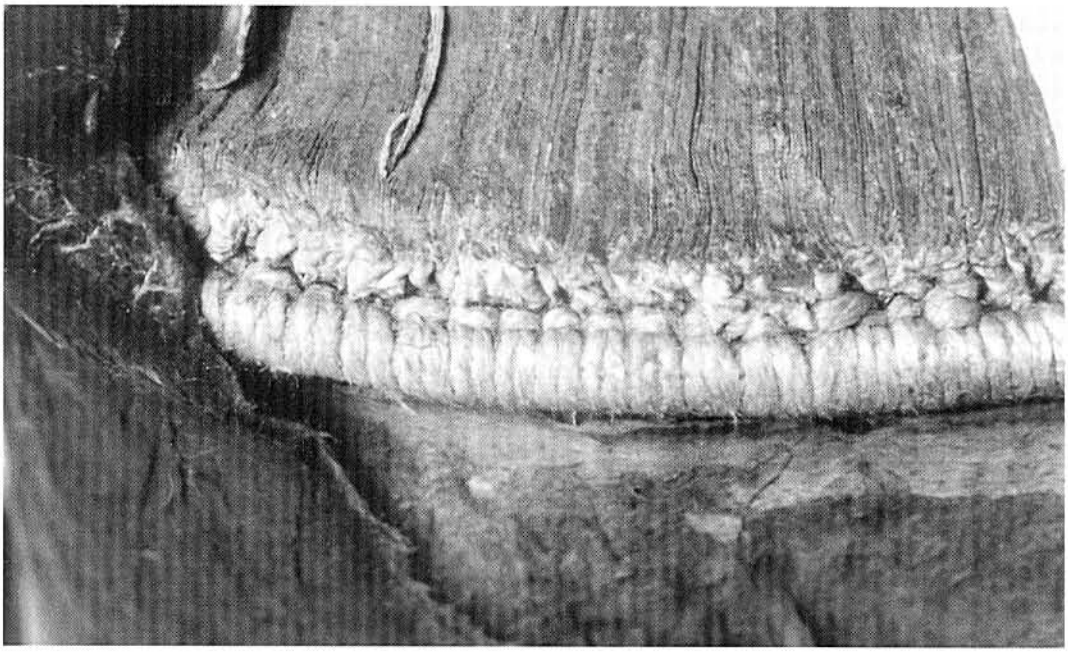


Figure 9.19 Integral endband, lodged in the slant of the spine; note the regular end spans, each encompassing two loops around the endband support (HAB O 10.a 2° Helmst., Strasbourg imprint from 1504).

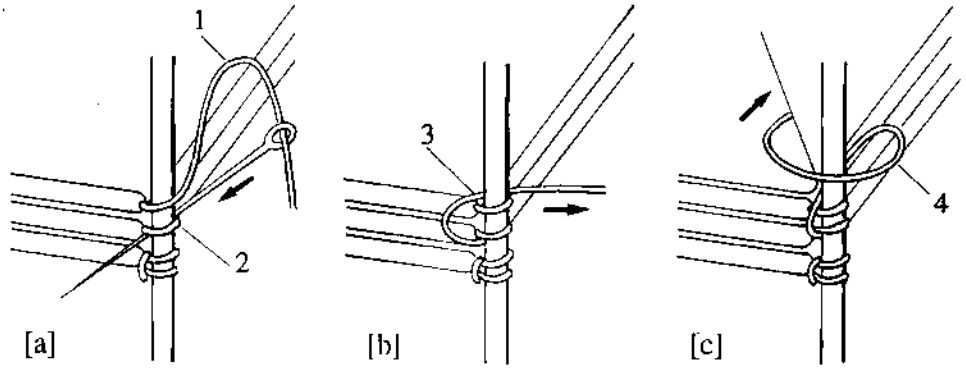


Figure 9.20 Diagram of three successive stages of the thread movement on working an integral endband: [a], the thread exiting from a given quire makes a loop around the support (1) and slips under the loop of the previous quire (2); [b], the thread climbs and passes behind the support (3); [c], before entering the next quire, the thread makes one or more loops around the support to cover it fully (4). The portion shown as (3) in [b] forms the regular end spans, which always number the half of the quires of the bookblock.

The two most common variants of Type I are shown in Figure 9.8[a] and [b]; the endband support is either placed at the very edge of the spine, often lodged in a spine slant (Rhein 1942b: '*echter Kapitalbund*'), or it is set away from the edge by some 10 to 25 mm ('*eingerückter Kapitalbund*'). In the latter case, the endband remains hidden underneath the covering as a raised band; in the former, the endband is visible with its characteristic pattern of span-like short stitches along the edge (Figure 9.19). These are, in fact, the change-over stitches, a span variant designated 'end span'; its construction is illustrated in Figure 9.20. Whereas the presence of a regular pattern of such end spans is compelling evidence for change-over at the edge, their absence is not necessarily proof of the contrary, for there were careless binders who felt that a few loops would be sufficient.

As a rule, integral endbands remained undecorated: Rhein (1942b) found among the 24 only three instances of secondary embroidery with cross-stitching (see below). I have seen 15 cases of integral endbands in Group A, 11 of the variant as in Figure 9.8[a], four of type [b]; five have a tab-shaped extension of the back covering, none have secondary embroidery. Most integral endbands were observed in bindings from the Lake Constance area and Germany; the earliest example is on a paper manuscript dated 1405 (SG Cod. 531), the latest on a Basle imprint of 1509 (HAB D 344.2° Helmst.). Carvin (1988 pp. 50–1) recorded four cases out of 132 bindings from Southern France with integral sewing, but failed to give details of their endband structure.

Finally, it should be noted that an integral endband of the type shown in Figure 9.8[a] does not prevent edge trimming. The endband hides safely in the slant spine edge to escape the knife, or it can be temporarily pushed onto the spine. Trimming with the drawknife (the instrument of choice here) would start just in front of the endband and continue towards the fore-edge. Repeated strokes in that direction are likely to take away more material in the fore-edge region, with the result that the height of the bookblock is slightly

larger at the spine than at the fore-edge. I observed such differences in heights of up to 10 mm, with the plane of the edge sometimes showing a slight shallow curve toward the fore-edge.

* * *

The primary wound endband (Type II) is mentioned in section 7.7, where it is argued that it is not a genuine carolingian binding structure but probably the result of a later repair. It seems to be an authentic element on romanesque bindings (see section 8.9, Figures 8.16 and 8.17). On gothic bindings it is usually worked on a single support and without an endband tab; the thread follows a figure-of-eight movement and, depending on the quire thickness, several extra loops can be made, yielding a packed structure (Figure 9.21). The needle enters the centrefolds from the head or tail edge and exits at the change-over stations, but separate holes closer to the edge may be used. Initially, working each quire was customary; later on, skipping quires at increasing intervals became the rule. The endband may be accommodated in a spine slant. This type of endband is always left without further decoration, but exactly the same structure serves as the base for secondary embellishment of Types III and IV and sometimes of Type VII.

Table 9.9 shows that endband Type II represents the second largest group (*c.* 20 per cent) of the cases examined. Virtually all examples come from the Lake Constance area, a few from Southern Germany. The 44 cases in Group A are on manuscripts dating from 1395 to 1484; supports of single thongs (white leather) and single cords are about equally distributed. The chi-square test revealed that leather thongs significantly prevailed before 1450 ($\chi = 16.5$). All 24 Type II endbands of the rebound manuscripts in Group C have

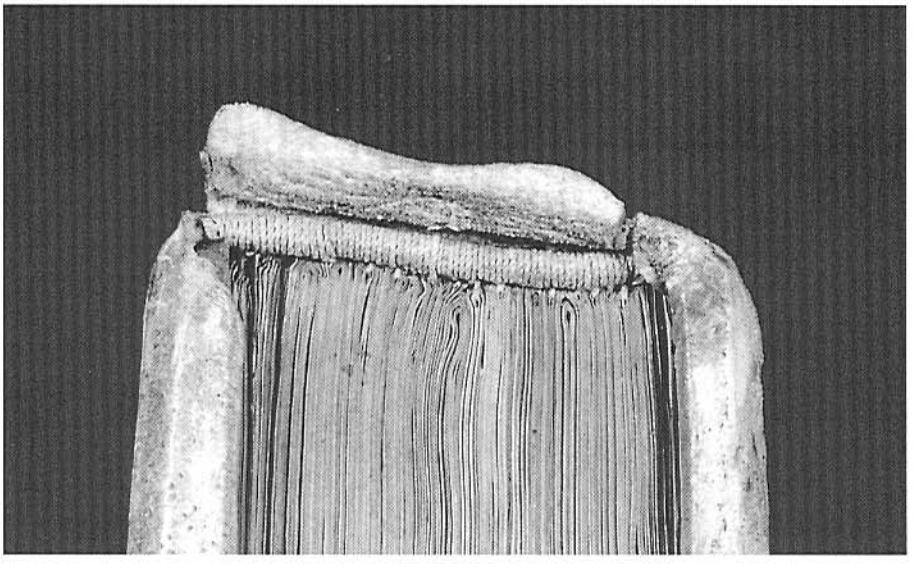


Figure 9.21 Primary wound endband (Type II, packed). Note that on the bookblock of 28 quires, some 60 loops have been made but only every fourth has been tied down. The leather covering of the spine has a tab-like extension, measuring about 15 × 80 mm (SG Cod. 209, s. x, rebound between 1436 and 1461).

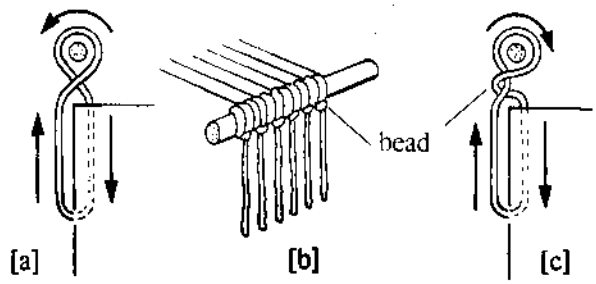


Figure 9.22 Thread movement of primary wound endband: [a], simple wound endband with figure-of-eight movement; [b], primary wound endband with back beads, with its figure-of-B movement shown in [c].

white leather supports. The thread of the endband is usually identical to that of the book-block sewing, but sometimes it is smaller in diameter, especially when extra loops have been made (see Figure 9.21). Spine slant was present in 24 of the 44 cases in Group A but only in six of the 24 in Group C; all 24 St Gall rebindings of the latter group have their back covering shaped into a tab (Figure 9.21).

From the literature it appears that the plain primary wound endband, with the figure-of-eight thread movement (Figure 9.22[a]), is the most common type north of the Alps; although its occurrence in France is documented by Carvin (1988), his details on its structure are rather scanty. In Italy, different variants of primary wound endbands had been popular, namely with a back 'bead' (Figure 9.22[b] and [c]). From their description by Giuffrida (1982) it appears that there are several ways to work this endband and several sorts of back beads. Though variants [b] and [c] are worked with a thread movement following the capital letter B, the latter may make use of link stitches forming a chain rather than beads. Other variants can be found in Federici and Rossi (1983 pp. 158ff.) and in Greenfield and Hille (1986 pp. 11–16). However, actual evidence for any of these variants is scarce and more research is needed to establish the geographical significance of their occurrence.

* * *

The saddle-stitch endband (Type III) is a modification of Types I or II, representing one of the most straightforward solutions of the binder's dilemma of how to handle the back covering at the head and tail. Rather than shaping the back covering as a tab or simply pasting the extensions over the endband, a strong connection between the covering and the endband is made by folding the leather over the endband and fastening it with saddle stitches, passing the thread underneath the supports. Generally, uncoloured sewing thread is employed, the holes having been pre-pierced, and the stitching was probably carried out with one piece of thread needled at either end; the finishing knot was made underneath the leather and any surplus leather cut away along a curved line on the edge (Figure 9.23). Adam (1911c) provided the first description of the saddle-stitch endband (see also Jäckel 1961; 1975; 1985; Gast 1983 and Gilissen 1983 pp. 78–9).

Table 9.9 shows that the occurrence of the saddle-stitch endband in Groups A

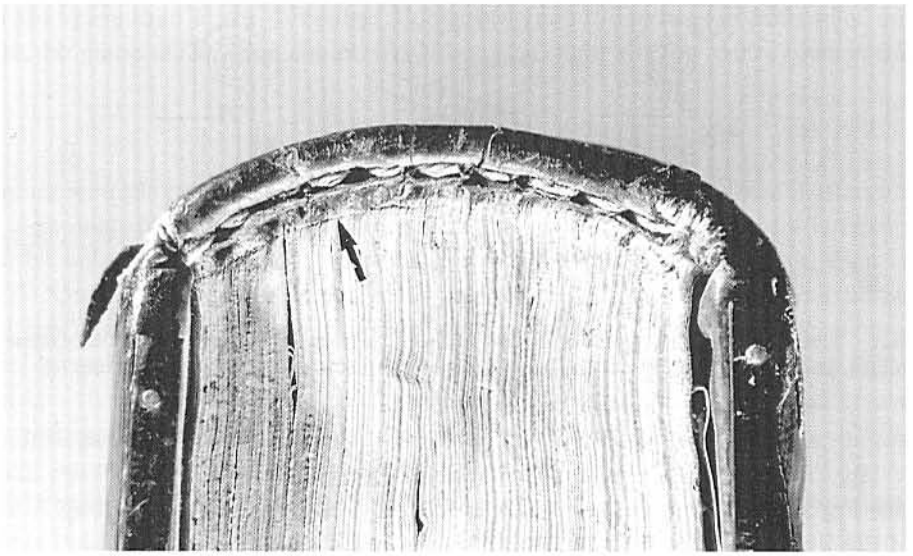


Figure 9.23 Saddle-stitch endband (Type III). Note the slightly curved score mark of the knife (arrow) on the edge, the result of cutting away the surplus leather (Libr. M 137, Cologne imprint from 1533).

and B amounts to not more than 34. The majority (29) was observed on bindings from the Netherlands, a few (5) from Germany. The earliest dated example with endband Type III is HAB Cod. Guelf. 1.7.7. Aug. 2° from 1434, the latest is a printed book Libr. M 117 from 1547.[33] In a few cases reference has been made to an earlier occurrence: Middleton (1963 p. 104) mentions mid-thirteenth century to the end of the fifteenth; Säuberlich (1979) observed in the 60 bindings from Saxony only two cases, the earliest dated to the fourteenth century. H. Petersen (1988 p. 148) thought that on German gothic bindings this type of endband had started to appear in the first half of the fifteenth century; Carvin (1988) does not seem to have encountered it in his material from Southern France.

* * *

Secondary embroidery on a primary wound endband (Type IV) had already been applied in romanesque bindings (see section 8.9, Figure 8.16[f]) and in 'alla greca' bindings (see section 6.11, Figure 6.18[d]). The cross-stitch embroidery seems to be one of the earliest variants. It can be worked with linen or silk, in two or more colours of up to eight pieces of thread in the same needle (Figure 9.24). Depending on the number of threads and the way the colours cross each other, the pattern can show endless variations; also, one, two or more auxiliary cores can be incorporated as was the case with some variants of 'alla greca' endbands. The secondary embroidery is either unattached to the back covering (which is turned in on itself to form the cap) and thus had been fully worked before covering, or the leather covering is cut flush with the primary endband and its edge is enclosed into the cross-stitching and thus had to be completed after covering. For details of working cross-

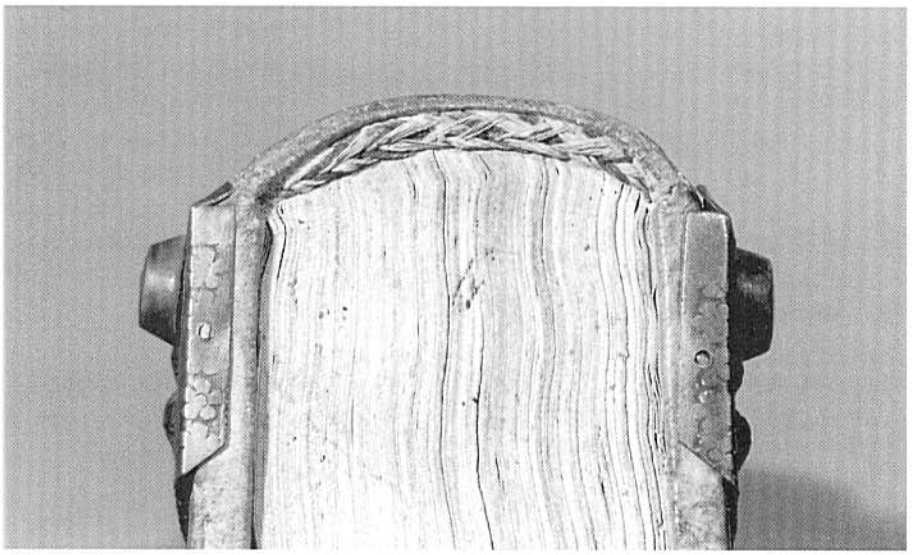


Figure 9.24 Secondary embroidered endband (Type IV) with cross stitch in two colours (white and brown), with four pieces of thread each (Amsterdam UB Inc. 69, from 1486).

stitch endbands see Jäckel (1961; 1975), Säuberlich (1979), Giuffrida (1982), Federici and Rossi (1983 p. 167), Gast (1983), H. Petersen (1988 pp. 152–8), *Tranchefiles* (1989 pp. 34–7) and Greenfield and Hille (1990 pp. 83–5).

Out of the 36 endbands of Type IV (Table 9.9) only 12 are embroidered with cross-stitching; ten are on incunabula from between 1470 and 1489, originating from Germany, Austria and the Netherlands and two on Corvinian manuscripts. Yet, the use of cross-stitch endbands was obviously wider and perhaps had started even earlier. The examples given by Jäckel (1975) come from Bavaria and are dated to the fourteenth and fifteenth centuries; relevant Saxonian bindings (eight cases out of 60) from the Cistercians of Altzelle are suggested to date from the thirteenth and fourteenth centuries (Säuberlich 1979). H. Petersen (1988 pp. 152–8) thought that they had been introduced only with the first incunabula; French examples cited in *Tranchefiles* (1989) date from the fifteenth century.

Another variant of the secondary embroidered endband is termed the renaissance endband and consists of straight loops around the primary wound endband, with one, two or more auxiliary cores; it is worked in two or more colours (usually silk thread) and, on luxury bindings, often also with gold thread (Figure 9.25). There are modifications which may have one or more beads formed without any auxiliary core or they may incorporate one or more chains of link stitches. Like the cross-stitch endband, the renaissance endband can be independent of the turned-in back covering, or it is worked through it; in the latter case, the perforations are usually very closely spaced and have often resulted in torn leather. Technical details of working this type of endband are provided by Gast (1983), Greenfield and Hille (1986 pp. 70–7) and H. Petersen (1988 pp. 156–61). Some further details are

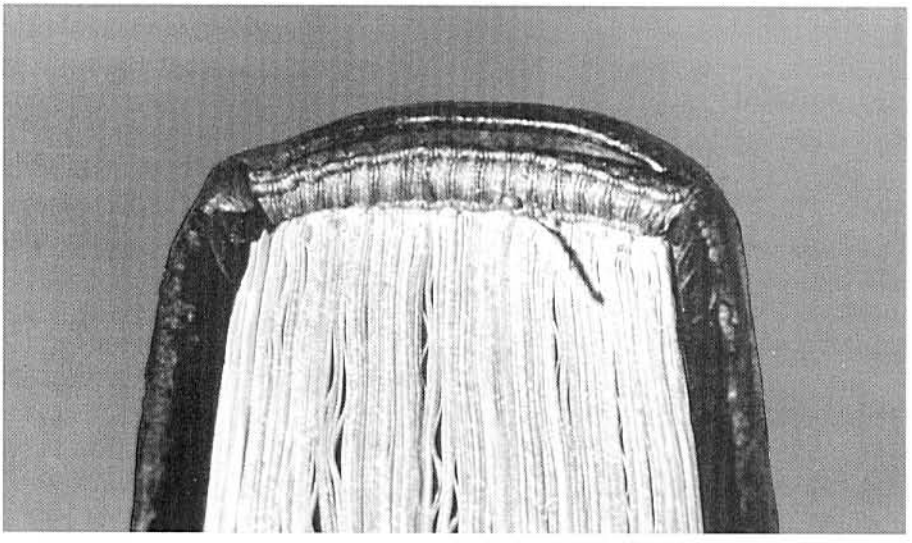


Figure 9.25 Secondary embroidered endband (Type IV) of renaissance type, worked in yellow and green silk and golden thread, on a Corvinian binding with gilt and gauffered edge (OSzK Cod. Lat. 435, parchment manuscript from *c.* 1490).

given by Carvin (1988 pp. 84–5) who observed them on French bindings from the fourteenth and the fifteenth centuries; 10 variants are described in *Tranchefiles* (1989 pp. 27–49).

Twenty-four of the Type IV endbands (Table 9.9) belong to the renaissance variants. Chronologically, they range from the mid-fourteenth to the mid-sixteenth centuries. Eleven were observed on English bindings, mostly late fourteenth and fifteenth centuries, most of them worked through the back covering, usually with three auxiliary cores and in two or three colours. Seven were found on Corvinian bindings, all of them unattached to the covering; the remaining six are from the Netherlands, Germany and Italy.

Although the two variants described above, namely the cross-stitch and the renaissance type, seem to be the most frequent ones of Type IV, there is at least one other kind of secondary embellishment. It could be described as weaving, similar to the Islamic endband (see Figure 5.5) and the embroidered byzantine endband (see Figure 6.12) except that the weaving around the circular warps follows a plain tabby pattern without any intertwining. The working of this endband is described by Jäckel (1961; 1975) and Gast (1983 fig. 16). I have observed this variant on a few German bindings on undated manuscripts, possibly from the fifteenth century, and on an incunable from 1492, originating from Mariazell Monastery, Austria (Amsterdam UB Inc. 373).

Finally, a variant should be mentioned where the secondary embroidery over a sound primary wound endband is replaced by a labour-saving imitation: it is covered with a coloured woven ribbon of *c.* 5 to 8 mm of width, wound like a spiral between the tie-downs (Figure 9.26). I found endbands of this kind, embellished with an identical ribbon, on three copies of a 1484 edition of a Koberger imprint (OSzK Inc. 518, The Hague MMW 1 F 50

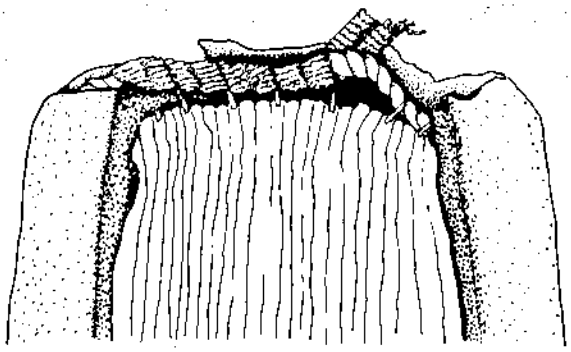


Figure 9.26 Endband with a simplified secondary embellishment: instead of embroidery, a woven ribbon is spiralled around a primary endband with only a few tie-downs (Koberger incunable from 1484 in a Nuremberg binding; OSzK Inc. 518; from Szirmai 1988a).

and Karlsruhe, private collection), and on a manuscript from 1498 (Nijmegen UB MS 293a). The occurrence of such endbands in Nuremberg monastic workshops in the second half of the fifteenth century was noted by Bock (1928) and Kyriss (1940 pp. 61–7). An even simpler method was to cover lengthwise the primary endband with a piece of ribbon which was fixed with a few stitches to the tie-downs. All ten instances of these endbands were met on bindings from the Netherlands, the earliest on an incunable from about 1490 (Libr. M 32).

Archival evidence concerns only the materials, such as in the accounts from 1481 of the Aragon court in Naples, where payment was made for '*oro filato e seta per fare li capitelli*' (De Marinis 1960 vol. 1 p. 4). Similarly, '*la soye à faire chapiteaulx*' is mentioned in the accounts of the Carthusians in Dijon from 1492 (Laffitte 1989).

* * *

Endband Type V, the primary wound endband with secondary braiding of leather lacing, was popular on late medieval bindings on the Continent. Usually, they are worked through the back covering, sometimes even tied down in the quires (Figure 9.27[a]). They are the first ones described in the literature, notably for antiphonaries (Dudin 1772, pl. XIII figs 1–4). Adam (1911c) described the same braided endband as well as the simple variant shown in Figure 9.27[b]. Jäckel observed a great variety of braided endbands, reconstructed them on models and imparted his knowledge in a series of articles and courses (Jäckel 1961; 1975; 1985; see also Gast 1983). Gilissen (1983 pp. 83–7) describes the construction of variant [c] in Figure 9.27, some others – not detailed here – are illustrated by H. Petersen (1988 pp. 134–47).

The leather lacing employed (ranging in width from 2 to 5 mm) is often of pink or white sheep- or goatskin, sometimes alum-tawed pigskin or vegetable-tanned calf; occasionally two colours are used. The antiphonary type in Figure 9.27[a] is sketched with a bead on the back, but it can also be worked without. Type [b] is identical with one of the leatherworker's edging braids: the movement is a sort of link stitch, which is analogous with the

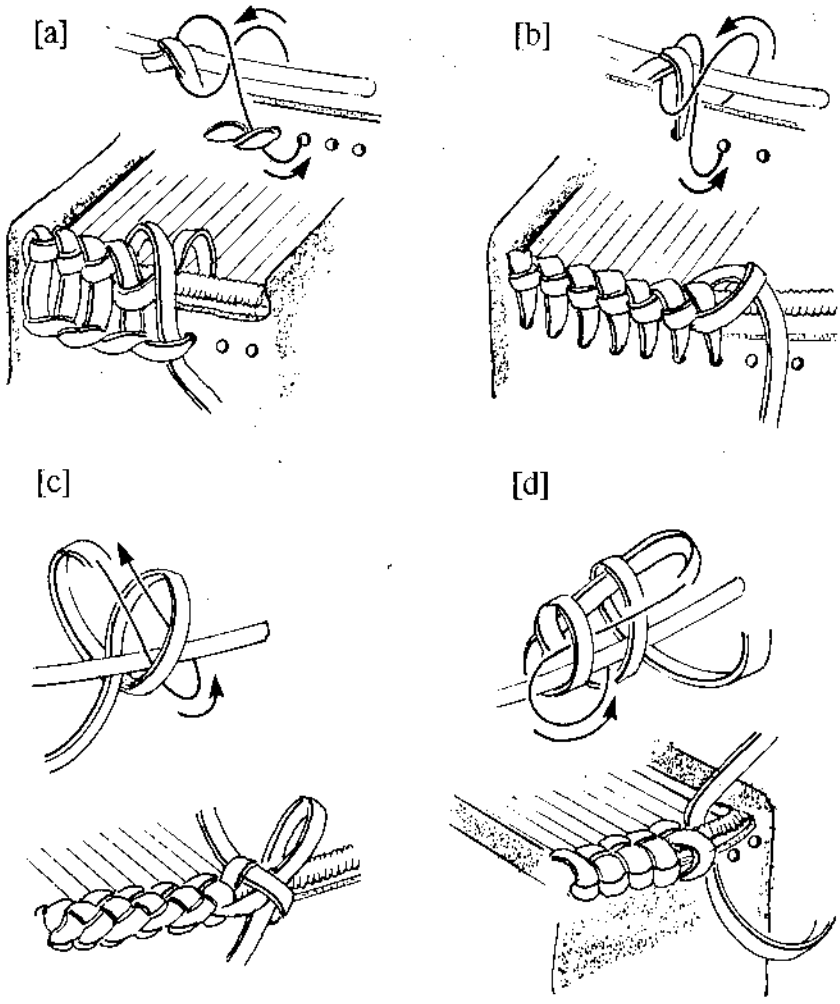


Figure 9.27 Diagrams showing four main variants of braided endbands (Type V): [a], 'antiphonary' type (Dudin 1772); [b], 'Spanish braiding'; [c], 'crossed braid' (often worked in two colours); [d], 'reversed loop braid' (in part after Jäckel 1985).

unsupported Coptic endband (Figure 3.6[a]); it is also termed Spanish edge braiding.[34]

Braiding with leather lacing can be worked in many several ways (Jäckel 1985; Gast 1983 figs 8 and 9), with or without enclosing the back covering. The braid shown in Figure 9.27[c] can be worked in at least two different ways and in two colours (Grant 1972 pp. 296–304; Jäckel 1985); it has its pendant in textile embroidery, notably in variants of the cross-stitch embroidered endbands (see above). These two different materials have been used sometimes on the same binding: textile at the head, leather braid at the tail (possibly because leather is more resistant against damage). This combination is frequently encountered on cuir-ciselé bindings (Leiden UB BPL 142; HAB Cod. Guelf. 15 Helmst.). The

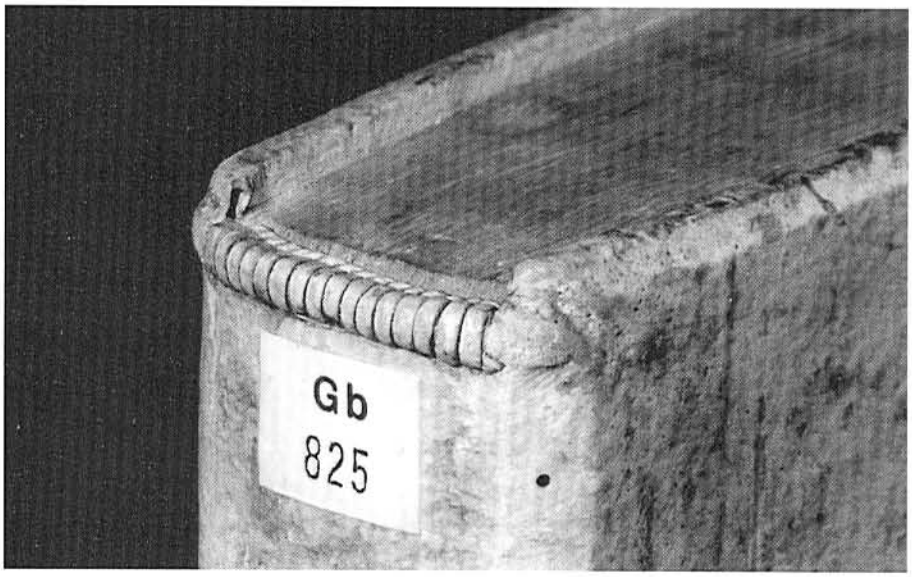


Figure 9.28 Braided endband: the leather lacing follows the movement shown in Figure 9.30[a]; the photograph shows that the endband lies in the spine slant and below the squares of the boards (Tübingen UB Gb 825 2°, Strasbourg imprint of 1486).

variant shown in Figure 9.27[d] was quite common in the Rhineland area and in the Low Countries. Another type of braiding is analogous to the common thread movement of the primary textile endband as shown in Figure 9.30[a] (Figure 9.28).

Table 9.9 suggests a numerical prevalence of Type V discussed above (over one-third of the total) but in fact the figures are biased, as the overwhelming majority (110 out of 132) belong to the St Gall rebindings (Group C). They show the simple variant [b] in Figure 9.27, exclusively employed in the St Gall workshop between 1436 and 1461. The lacing, about 4 to 5 mm wide, is of the same chamois leather as that used for the covering; the only attempt to achieve a decorative effect was the use of white lacing with black surface staining (seven cases). In the heterogeneous Groups A and B the occurrence of braided endbands is far less frequent; they belong to types [b], [c] and [d] in Figure 9.27, the latter being more frequent in the Librije material and worked through the back covering.

Since the covers of gothic bindings are provided with squares (see section 9.8), they usually protrude beyond the endband and thus contribute to its protection; although this feature is equally found with the other endband types, it is often especially prominent on those with secondary braiding (Figure 9.28). Leaving the back covering with a protruding tab was a regular practice on gothic bindings; I encountered several instances where braided endbands are worked through such a tab (Figure 9.29).

The 132 endbands of Type V, listed in Table 9.9, are divided about equally between Germany, the Lake Constance area and the Low Countries. The only two relevant examples found in England are in fact both of Flemish origin: Cambridge UL Add. 618

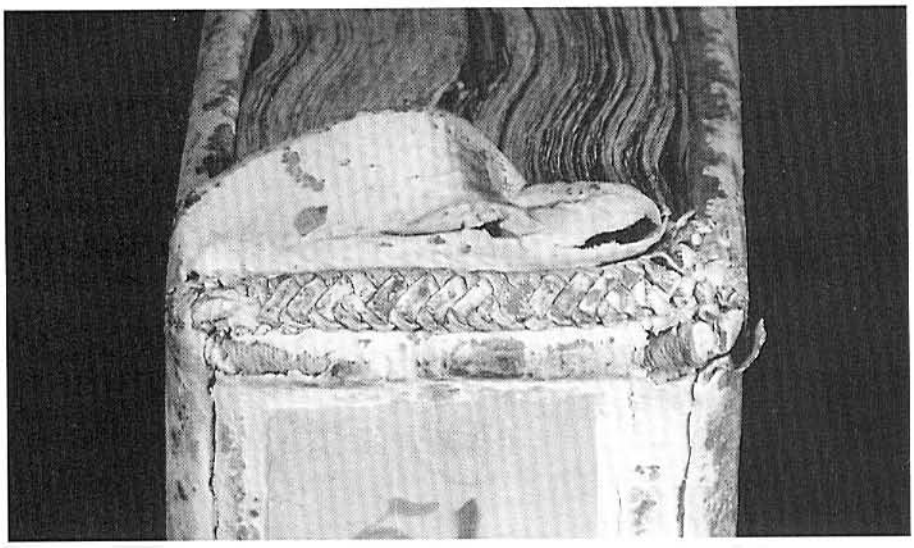


Figure 9.29 Braided endband (crossed braid, [c] in Figure 9.27) worked over the outer part of a double support (integral sewing as in Figure 8.7[a]) and through the tab-shaped extension of the back covering (BLB Reich. 51, paper manuscript dated before 1395).

and Add. 3069, the latter an example of the antiphonary type. The earliest example I encountered was on a paper manuscript dated prior to 1395 (BLB Reich. 51), the latest on a Basle imprint of 1547 (Libr. M 117). Data in the literature on braided endbands are scanty, yet their occurrence in the Germanic countries is well documented by Adam (1911c), Jäckel (1961; 1975), Gast (1983) and H. Petersen (1988), but their dating is only given vaguely between the fourteenth and fifteenth centuries. Their appearance in France was first documented by Dudin (1772); they have been recently observed on French fifteenth-century bindings by Carvin (1988 pp. 83–4) and on several French manuscripts by Sheppard (1986 p. 45). Further French examples from the early fifteenth century were noted by Gilissen (1983 pp. 79 83) in Brussels BR. There is no evidence that they had been employed in England to any considerable extent: Middleton (1963 pp. 104–5) considered them rare while Gast (1983) did not observe them at all.

* * *

Since endbanding was a time-consuming process, attempts were made to simplify it and thus speed it up. One obvious approach was to reduce the number of tie-downs by anchoring the primary endband through fewer quires. Another means was to omit the embroidery as a separate step and to achieve a similar decorative effect by working the primary endband immediately with threads in several colours (Type VI), essentially the predecessor of the modern binders' handmade endband. The two threads cross each other at the front, thus producing a small bead (Figure 9.30 [a]; tying down, usually in a few quires only, is carried out with the thread of lighter colour (off-white or yellow). The endband support consists of a single thong, or of one or two strips or a rolled piece of parchment; the

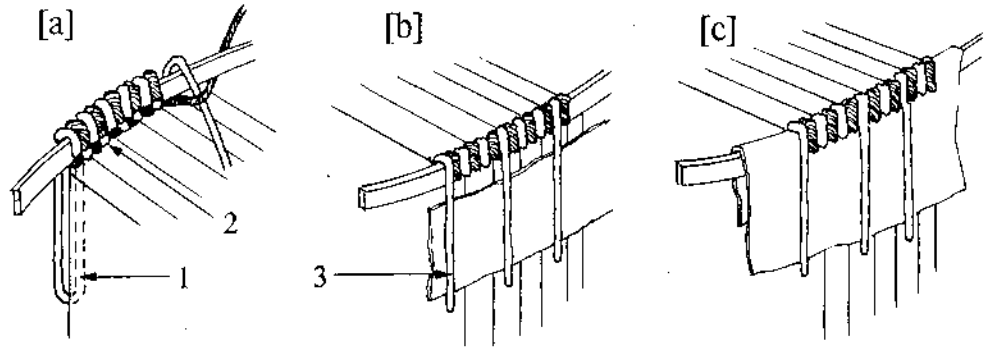


Figure 9.30 Three variants of the primary embroidered endband (Type VI), worked with two threads of different colour and with front beads (1): [a], the endband support lies loosely at the edge, held in position by the tie-downs only (2); [b], the tie-downs run over the endband lining which is independent of the support; [c], endband support wrapped into the endband lining.

support is either independent of the spine lining [b], or it is wrapped into the lining and glued as a unit to the spine [c]. Initially the supports were anchored into the board corners, but later this firm attachment between the bookblock and the cover was dropped and the endband supports were used as mere cores. As with the renaissance endband more than two colours might be employed and one or more auxiliary cores included.

De Bray's notebook (1658 pp. 13–16) contains the earliest description of this type of endband, sewn with double threads of yellow and red silk over a support of two parchment strips. Zeidler (1708 pp. 106–9) explains the construction of this endband with double and even quadruple thread in two colours; he uses a transverse parchment lining, with its edge slightly protruding beyond the bookblock; for larger books a cord is included. Further details and the first illustrations are given in the manuals of Prediger (1741 vol. 1, pp. 97–105, pl. 30) and Dudin (1772 pl. IX). The primary embroidered endbands of Type VI listed in Table 9.9 originate from Germany and the Netherlands. The earliest examples occur on several paper manuscripts from the fifteenth century; the first exactly dated example is an imprint of 1534 (Amsterdam UB Ned. Inc. 184). Jäckel (1975) and Carvin (1988 p. 86) refer to them as dating from the second half of the fifteenth century.

* * *

Short-cut endbands (Table 9.9, Type VII) are the result of the ultimate effort in labour-saving: they have neither an endband support nor is there any sewing to affix them properly to the bookblock. Usually they consist of a piece of lining, glued down at the head and tail, carrying some embellishment at the protruding edge. Such an embellishment was, for example, a twisted strand of coloured threads, tied together and attached with a few stitches to the edge of the parchment lining; among the few cases I could observe were Nuremberg incunabula from 1495 and 1497 (Amsterdam UB Inc. 450 and Budapest UL Inc. 616a respectively). Yet, after *c.* 1500 and more frequently, an imitation of a primary embroidered endband was usually made by a two-coloured buttonhole stitch at the edge of the parchment lining; as it was held only by glue, such 'stuck-on' endbands have often come off the

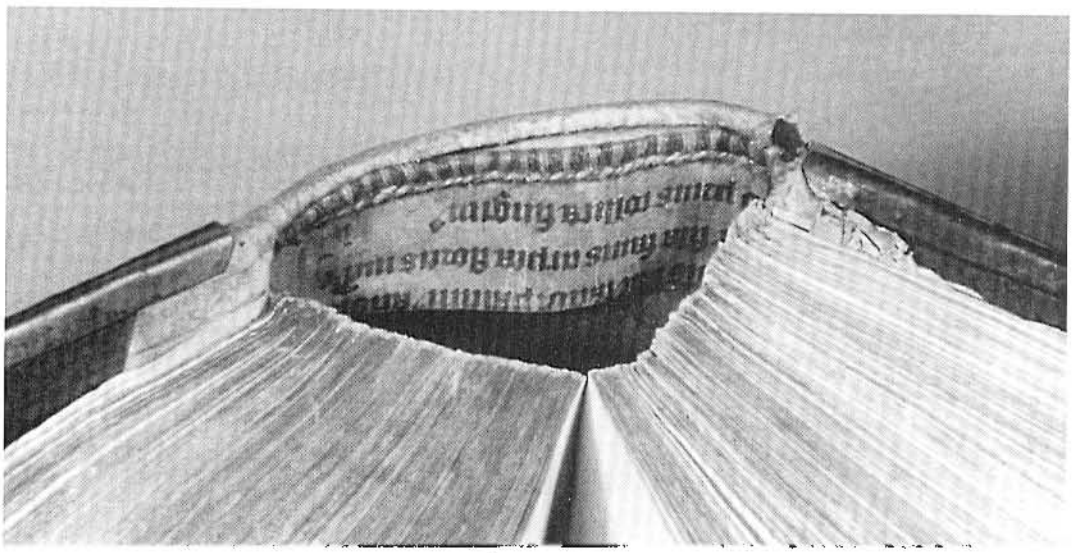


Figure 9.31 Stuck-on endband (Type VII) worked on the edge of a parchment endband lining with double thread in two colours; the thread has no connection with the bookblock and the lining has become detached from the spine (Amsterdam UB Ned. Inc. 193, imprint from 1540).

spine, proving that they had been nothing but decoration (Figure 9.31).[35] I have recorded five such endbands; the earliest one was dated 1503 (BSB Clm 15305).

9.8 BOARDS AND BOARD ATTACHMENT

Although occasionally pasteboard and leather are used for boards, gothic bindings generally have wooden boards. Oak and beech were the two main sources as shown in Table 9.10. Virtually all English bindings and at least the major part (*c.* 75 per cent) of Dutch bindings are bound in oak boards. In Germany and the Lake Constance area the preference is just the other way around: here beech prevails with *c.* 90 per cent. Although beech seems to dominate in Groups A and B at a later period, the prevalence is statistically not significant. However, the trend becomes obvious when looking at a particular region. The carolingian bindings of St Gall have oak boards nearly exclusively (see section 7.3); those which had been rebound between 1436 and 1461 (Table 9.10, Group C) have mostly retained their original boards, but beech was employed when new boards were required.

The findings in Table 9.10 confirm earlier data from the literature: Pollard (1976) found that English bindings almost without exception have oak boards. From the data of Carvin (1988 pp. 23–5) for French bindings one can assume, though with some caution, that at least two thirds of the identified wooden boards are made of beech, whereas oak is rather infrequent; the remainder are made of pinewood and walnut. According to Jäckel (1977), who had great experience of material from Germany, oak had started to be replaced by beech as early as the eleventh century; softwood was seldom employed. Although walnut

Table 9.10 Material of wooden boards of gothic bindings

Group		*Oak*	*Beech*	*Other**	*Unknown*	*Total*
A: General	England	20	–	–	1	21
	Netherlands**	17	3	–	2	22
	Germany	3	20	1	22	46
	Lake Constance	2	47	2	1	52
	Others	2	14	–	3	19
Total of Group A		44	84	3	29	160
B: Zutphen Librije		68	26	–	16	110
C: St Gall rebindings		81***	41	–	8	130
Total		193	151	3	53	400

* pinewood and fruit tree

** including Rhineland and Westphalia

*** includes 13 cases with one reused oak board, the other renewed in beech

is repeatedly mentioned as being often used, the evidence seems rather unsound.[36] Beech is specified in the German manual of Zeidler (1708 p. 105). For Italy, the data are scanty: Federici (1985) indicates that beech was widespread in the fifteenth and sixteenth centuries; other species he mentions are poplar, oak and lime. The use of beech in Italy is testified by archival evidence: a text of Giovanni Brancati, librarian at the Court of Aragon in 1480–5, praising the binder Scariglia for purchasing only the best of materials, among others the '*assicelle di faggio*', for set prices from constant sources (De Marinis 1960 vol. 1, p. 6).

In the previous chapters on carolingian and romanesque bindings it was mentioned that, in the majority of cases, quartered boards had been used; this clearly applies to gothic bindings of Group C, of which two thirds have reused (carolingian) boards. In Groups A and B, this aspect could be studied in only 36 cases: 21 are quartered, 15 *en dosse*, the latter usually with the concave side of their growth rings pointing outwards. This is of interest since Faust (1612, pp. 74–5) had already stressed that the curved line (of the growth rings) should point outwards. Prediger (1741 vol. 1. p. 93) pointed out why: books with fastenings should have their boards slightly warping to the outer face, to ensure pressure over the whole bookblock; for the same reason he recommends (p. 18), again for books with fastenings, to beat the quires down more at the folds than at the fore-edge. The latter advice had already been given by Faust (1612 pp. 72–3) and de Bray (1658 p. 25). Probably for the same reason the boards had to be cut thinner at the spine than at the front edge, as seemingly meant by Faust (1612 pp. 74–5) and clearly stated by Prediger (see above). I measured differences in thickness of the covers at the spine and front edge (up to 5 mm) on about 10 bindings in Group B, all dating from the second half of the sixteenth century.

Table 9.11 Squares on gothic bindings. The data are combined from Groups A and B and include 221 bindings with their texts dated exactly or at least estimated within half a century. The presence of squares has been assumed if the difference between the height of the covers and that of the bookblock exceeds 6 millimetres

Period	*With squares*	*Without squares*	*Total*	*Per cent*	*Mean of squares*	
					mm	*s.d.*
s. xiv^1	2	5	7	(28)	6	–
s. xiv^2	1	4	5	(20)	7	–
s. xv^1	4	21	25	16	6.0	0.8
s. xv^2	66	32	98	67	6.8	2.3
s. xvi^1	50	–	50	100	8.7	2.7
s. xvi^2	36	–	36	100	9.5	2.0

Apart from these few bindings, the thickness of boards is uniform overall, with mean values for Groups A, B and C of 8.3 mm (*s.d.* 2.4), 11.2 mm (*s.d.* 2.5) and 12.4 mm (*s.d.* 4.2), respectively. The lower mean value in Group A is due to a number of small prayer books with boards of 4 to 5 mm and the Corvinian bindings with thin covers of not more than 6 to 7 mm thickness. Whereas carolingian and romanesque bindings have no squares, they had appeared on gothic bindings in the course of the fifteenth century. Table 9.11 summarizes the relevant findings. The three cases with squares dating from the fourteenth century are later rebindings and could serve us as a warning: squares in the fourteenth century are unlikely to be an original feature. The four bindings with squares from the first half of the fifteenth century are certainly in their first original binding; the earliest is on a paper manuscript dated 1432 (SG Cod. 448). In the second half of the fifteenth century squares had already become standard and in the sixteenth century exclusive practice. For Group C these parameters could not be evaluated since the rebindings had been made within a short time span (between 1436 and 1461); 85 per cent have squares, with a mean value of 5.9 mm.

* * *

Having selected the boards and cut them to size, the binder would proceed with bevelling the edges. Generally, he would bevel the spine edge from the outer face of the board in order to provide a smooth entrance path for the support slips, and from the inner face to accommodate the shoulder of the bookblock. The free edges could have remained square, bevelled on the inner face or on either face of the board; the bevel on the outer face might have been taken along the whole length of the board edge, it might have been stopped short at the corners (to leave solid ground for corner pieces) or interrupted at places of any intended fastening. Whereas the variety of bevels is limited to a few basic types (most of them shown in Chapters 7 and 8, Figures 7.5 and 8.9 for carolingian and romanesque bindings respectively), they had been combined into a seemingly endless number of variants. Figure 9.32 illustrates the most common patterns of board profiles.

Slightly more than one half of the profiles in Figure 9.32[a] to [l] are characterized by a rounding of the spine edge; the free edges are left square, [a], or furnished with the

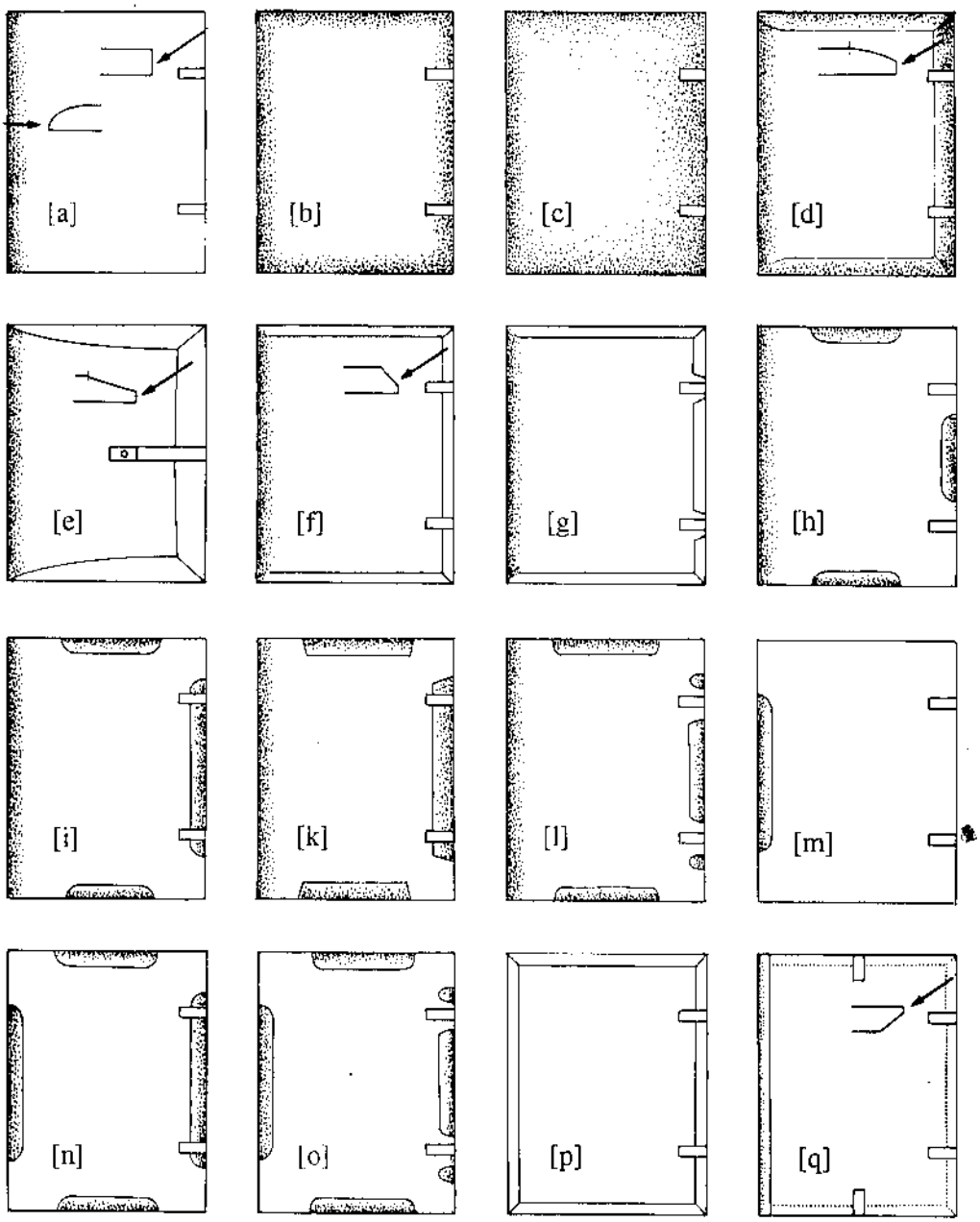


Figure 9.32 Diagrams of various outer profiles of the boards of gothic bindings, listed in Table 9.12. Rounding is shown as stippled areas, flat bevels are blank, sharp ending of the bevel is marked with solid line; inner bevel shown with dotted line.

same rounding as at the spine, [b]; the rounding can be taken as far as into the centre of the board [c] ('cushioned'). The rounding may merge gradually into the face of the board or end abruptly along a sharp line, with more or less accentuated mitres, [d] and [e]. Both rounding and flat bevel may run along the full length of the edge, [b] to [f], or be interrupted according to various schemes, [g] to [o]. Whereas the spine bevels usually run along the full length, they may be partially bevelled or rounded too, [m] to [o]. Finally, boards may be provided with a rather narrow flat bevel all around, [p], or restricted to the spine edge only, [q]; the latter, characteristic of the Corvinian as well as of Italian bindings, always have an inner bevel along the free edges, thus giving the boards an elegant appearance. Comparable inner bevels are also frequently combined on boards with partial outer bevelling, like those of [h] to [l], [n] and [o].

In Table 9.12 the outer board profiles of bindings in Groups A, B and C, are summarized, complemented with data from the literature. Kyriss' work (1951–8) on gothic bindings from Southern Germany gives representative illustrations of nearly one hundred monastic workshops or individual binders, active in the period from 1433 to 1555. From Schmidt-Künsemüller's (1980) corpus of cuir-ciselé bindings in the Germanic area a selection was made of those which are sufficiently clearly photographed to identify their board profile; this material originates from the period between about 1400 and 1500. The various profiles are labelled with the corresponding letters and in the same order of appearance as in Figure 9.32. Group A has been subdivided into the main geographic regions to allow comparison with the data of Kyriss and Schmidt-Künsemüller (note that the Librije Group B comprises bindings mainly from the eastern Netherlands and from the sixteenth century; bindings in Group C originate from the Lake Constance area and are dated between 1436 and 1461).

From Table 9.12 it becomes evident that profile [a] is ubiquitous, with the highest incidence in Germany (Groups D and E); the all-over rounded or cushioned profiles [b] and [c] are especially dominant in the Netherlands, [c] in England, but type [b] is also frequent in Austria. Type [d] is prominent in the Librije Group, as well as the clustering of types [h] to [l]; most of types [m] to [o] occur in the German material in Groups D and E. The profiles of the St Gall rebindings belong to the two main types [b] and [f], highlighting that in this particular workshop two different board profiles were in use within the brief period between 1436 and 1461; this might have been the result of external influences, since monks from various German monasteries had played a prominent role in the refurbishing operation (see note 7).

There are several other examples for the concurrent use of different board profiles within the same workshop. Kyriss (1940 p. 18) found both interrupted- and full-length bevels on bindings of the Nuremberg Dominicans, active between 1433 and 1522. He observed that the choice of profile is related to the kind of furnishings used: a full-length bevel along the spine edge, combined with square or bevelled free edges (such as shown in Figure 9.32[a] to [g] and [p]) were preferred when bosses were to be used, whereas the interrupted profiles, leaving the corners square (such as types [h] to [o]), were used with corner pieces and corner guards. Kyriss (1940 p. 46) found a confirmation in the custom of the Nuremberg Augustinians (active between

Table 9.12 Various outer profiles of the boards of gothic bindings in Groups A, B and C; added are Group D, containing data from Kyriss (1951–8), and Group E with data from Schmidt-Künsemüller (1980). For the code of the profiles see Figure 9.32

	Profile																	*Total of*
Group	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*k*	*l*	*m*	*n*	*o*	*p*	*q*	*?**	*bindings*
A: England	**2**	**2**	**15**	–	–	–	–	–	–	–	–	–	–	–	–	–	**3**	**22**
Netherlands**	2	22	15	–	–	–	–	–	–	–	–	–	–	–	–	–	–	39
North Germany	6	3	–	–	–	5	–	–	–	–	–	–	–	–	2	–	–	16
South Germany	7	1	–	–	–	2	–	3	–	–	–	8	–	–	2	–	5	28
Lake Constance	3	7	–	–	2	28	–	–	1	–	–	–	–	–	11	–	–	52
Hungary	2	–	–	–	–	–	–	–	–	–	–	–	–	–	–	6	–	8
Others	2	1	–	–	–	–	–	1	–	–	–	–	–	–	3	2	3	12
B: Zutphen Librije	5	3	26	18	–	–	–	11	4	3	27	–	3	6	–	–	2	108
C: St Gall rebind.	–	42	–	–	6	80	–	–	–	–	–	–	–	–	–	–	2	130
Total	29	81	56	18	8	115	–	15	5	3	27	8	3	6	18	8	15	415
Percentage	7.0	19.5	13.5	4.3	2.0	27.7	–	3.6	1.2	0.7	6.5	2.0	0.7	1.4	4.3	2.0	3.6	100.0
D: Rhine./Westph.	–	6	–	–	–	–	–	4	–	–	–	–	–	–	–	–	–	10
North Germany	5	2	–	–	–	–	–	–	–	–	–	3	1	–	–	–	–	11
South Germany	34	3	–	–	–	–	2	5	2	–	–	13	4	8	–	–	–	71
Total	39	11	–	–	–	–	2	9	2	–		16	5	8	–	–	–	92
Percentage	42.4	12.0	–	–	–	–	2.2	9.8	2.2	–	–	17.4	5.4	8.7	–	–	–	100.1
E: Rhine./Westph.	3	1	1	–	–	–	1	–	–	–	–	–	1	–	–	–	–	7
North Germany	57	19	–	–	–	–	10	4	–	–	–	12	4	2	–	–	10	118
South Germany	22	6	1	–	–	–	–	2	3	–	–	6	6	4	–	–	7	57
Austria	101	56	1	–	–	–	6	–	–	–	–	9	–	–	–	–	13	186
Bohemia/Poland	16	11	–	–	–	–	3	–	1	–	–	3	–	–	–	–	5	39
Total	199	93	3	–	–	–	20	6	4	–	–	30	11	6	–	–	35	407
Percentage	48.9	22.8	0.7	–	–	–	4.9	1.5	1.0	–	–	7.4	2.7	1.5	–	–	8.6	100.0
Total overall	267	185	59	18	8	115	22	30	11	3	27	54	19	20	18	8	50	914
Percentage	29.2	20.1	6.5	2.0	0.9	12.6	2.3	3.3	1.2	0.3	3.0	5.9	2.1	2.2	2.0	0.9	5.5	100.0

*? means the profile could not be determined

** includes Rhineland and Westphalia

1464 and 1526), who had employed bosses on the lower covers with full-length spine bevelling but used corner pieces on the upper covers with interrupted profiles. Testing this relationship in the Librije Group has indeed yielded a significant prevalence of bosses in combination with full-length spine bevelling and of corner pieces with interrupted profiles (chi-square test, $\chi = 14.6$). A major portion of the bindings with interrupted profiles, notably of the type [l] and [o], came from the workshops of the Brethren of the Common Life in Doesburg and Deventer. Since these bindings date already from the second half of the sixteenth century, the effect of chronology was also tested for the Librije Group: in fact, the prevalence of full-length profiles in the early period (before 1540) turned out to be significant ($\chi = 19.2$).

The above data suggest that the profiles on the outer face of boards are related to the kind of furnishing and particular periods of time, and probably also to particular regional preferences. The popularity of cushioned boards, [c], in England and the Low Countries (including Rhineland and Westphalia) underlines once again the close contacts between these regions (see also Foot 1993 pp. 146–63); Oldham (1952 p. 8) found a 'slight bevel all round' common in England. France, too, seems to have favoured uniform edges: Gid (1984 vol. 1 p. xiii) remarks on her material dating from the late thirteenth to the mid-sixteenth centuries that '*ces ais ne sont jamais biseautés, mais simplement allégés du bord. Au contraire, dans les pays germaniques, les biseaux sont la règle et varient d'une région à l'autre*'. Carvin (1988 pp. 55–9) recorded the board profiles in about one half of a total of 132 bindings from Southern France; about 60 per cent of these seem to be of type [b] or [c], some 20 per cent probably type [d]. A flat or very slightly rounded outer spine profile, combined with elegant inner bevels along the free edges [q], occurs in Italy and on the Corvinian bindings, as first noted by Gottlieb (1910 cols 38–40).

The interrupted outer bevelling is characteristic of the Germanic areas north of the Alps, as already observed by Oldham (1952 p. 9). It is first mentioned in Zeidler's manual (1708 p. 105): for ordinary books, an all-around straight inner bevel is sufficient, '*Aber bey den Schweinsleder Bänden müssen die Büchenen Breter der zierrath halben auch auswendig an etlichen Orten, nemlich zwischen den Clausuren etc. mit dem Messer zugeschäerfet*'. A combination of interrupted outer bevels with a full-length flat inner bevel along the free edges had begun to appear around the 1480s and became standard in Germany in the early sixteenth century (Kyriss 1940 p. 70).

* * *

A typological characteristic of gothic bindings is that the slips of the sewing supports enter the boards over the bevelled spine edge. The diagrams in Figure 9.33 show the main variants of the lacing paths: most common is type [b], where the support enters the first hole (usually bored obliquely at some five to 10 mm from the edge), travels in a channel in the inner face of the board to the second hole, where it exits again and is plugged with a dowel or wedge. Variant [a] is a shortened one-hole version. Both [a] and [b] (as well as [c], a three-hole variant) occur with either thong or cord; [d], [e] and [f] employ thongs only which are fixed in shallow channels with trenails or iron nails.

Lacing path [d] of Figure 9.33 was observed in Germany by Adam (1916b;

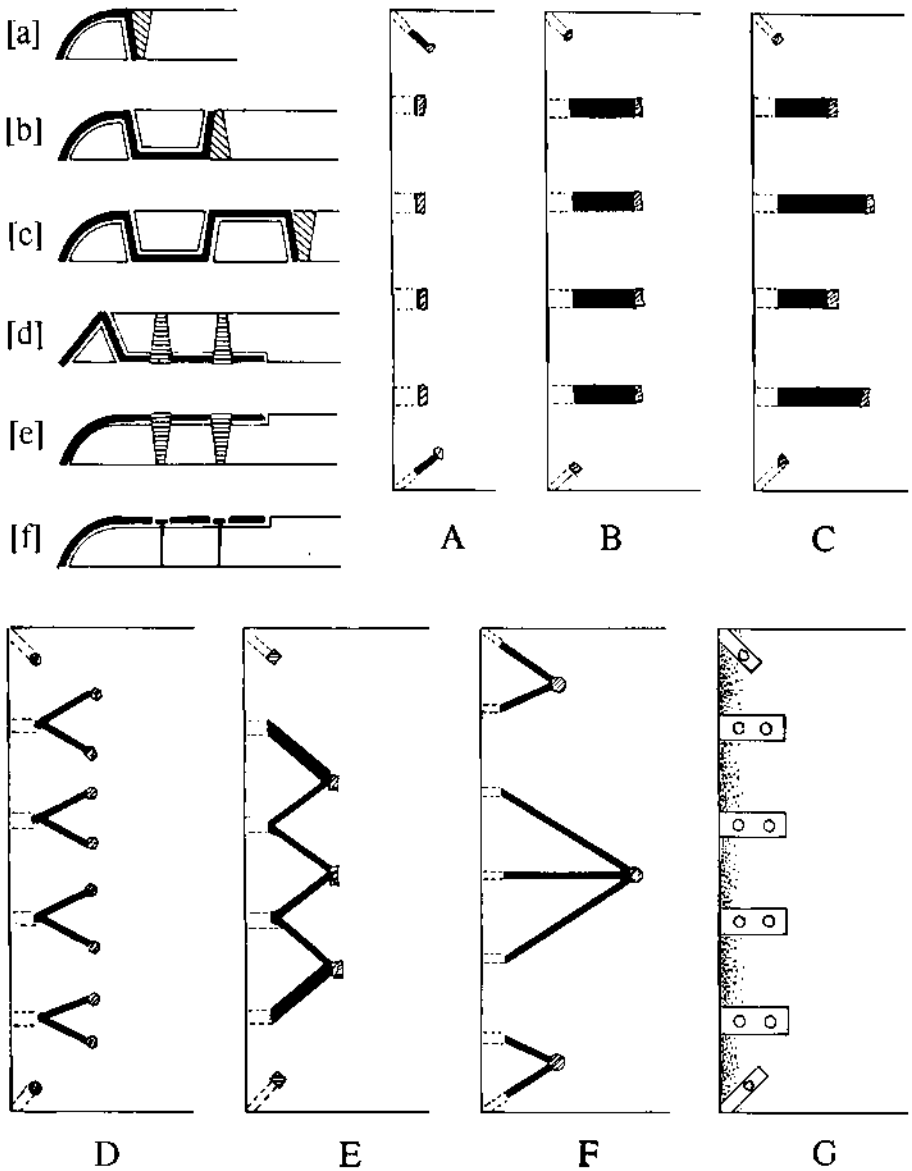


Figure 9.33 Main types of lacing paths on gothic bindings: [a] to [f], cross-section with the outer face being on top; dispositions [A] to [F] show the lacing path as seen on the inner face of the board; [G] shows attachment [e] as seen on the outer face of the board. The course of the slips: blank (outer face), black (inner face).

1923b); a similar design was found by Giovannini (1991 p. 40) on fifteenth-century bindings of the Franciscans in Fribourg (Switzerland), where the supports enter in the middle of the thickness of the spine edge. The latter can be considered as a transitional form between romanesque and gothic types of lacing paths. A sort of combination of these two types of

attachment also occurs: the rebindings of the Würzburg Dombibliothek manuscripts have a board profile as in Figure 9.32[n], with a partial bevelling of the spine edge; here the central support slip is taken over the bevelled spine edge and onto the inner face of the board, whereas the two outermost slips enter through the square portions of the edge (examples: Würzburg UB Mp.th.f. 5; Mp.th.f. 21). Another curious combination makes use of five gothic (type [a]) and four romanesque (see section 8.6, Figure 8.10[h]) lacing paths on a slightly bevelled spine edge of a fourteenth-century manuscript of uncertain origin (Bodley Bodl. 250).

The disposition of the lacing paths may adopt various patterns. Figure 9.33[A] shows holes equidistant from the spine edge for lacing path [a]; pattern [B] is of the very same disposition, but for lacing path [b]. The modification of pattern [B] utilizes staggered channels of different lengths, obviously to prevent splitting of the board. Pattern [D] is less frequent for supports that are split after having been taken through the first hole and carried further in separate channels splayed out; in contrast, pattern [E] reduces the number of holes by combining the plugging of adjacent supports. Disposition [F] shows the best economy: five supports (and two endband supports) require only three holes and dowels. The lacing path of the endband supports is usually similar to that of the main supports; in cases where the main supports show the one-hole attachment of type [a], the endband supports are often according to [b].

Table 9.13 shows that lacing path type [b] dominates (over 90 per cent) in combination with dispositions [B] and [C] fairly in balance (38 and 39 per cent respectively). This is in fact the very variant that Faust (1612 pp. 76–7) describes in some detail and illustrates with simple sketches; he mentions wedges of softwood as well as the adjustment of the proper tension of the slips by placing a folder between the boards and the bookblock and covering the lacing paths on the inner face with patches of parchment, affixed with hot glue. The same attachment is described by de Bray (1658 pp. 24–5), who also mentions bevelling the inner and outer spine edge, and by Zeidler (1708 pp. 105–6). The figures for the other attachment types in Table 9.13 are too limited for any general conclusion, although the occurrence of type [a] in Group B and of types [e] and [f] mainly in bindings from the southern regions in Group A might be of some significance. The latter two variants have also been observed by Carvin (1988 pp. 64–5) on bindings possibly originating from Italy.

As mentioned before, wooden boards were the rule in gothic bindings, but leather or pasteboard was incidentally used as board material. There is early evidence in archival sources: out of more than 2000 volumes listed by Gasnault (1980), 10 instances of bindings '*cum postibus papireis*' were listed in the 1369 inventory of the Papal Library of Avignon. Laffitte (1989) mentions perhaps the earliest one from 1335: '*cooperta de papiro cum corio viridi*'. According to A. Hobson (1989 pp. 252–4) in Italy pasteboard had become the generally accepted replacement of the wooden boards around 1470; the prevalence in Spanish and Italian material suggests that pasteboards were an inheritance from Moorish Spain (see also section 5.3).

Table 9.13 Lacing paths and their disposition in gothic bindings of Groups A (with geographical subdivision), B and C

Group	*Lacing path*					*Disposition*						
	*a**	*b*	*c*	*e/f*	*Total*	*A*	*B*	*C*	*D*	*E*	*G*	*Total*
A: England	1	18	–	1	20	1	3	4		11	–	19
Netherlands**		19	–	–	19	–	6	11	–	2	–	19
Germany	3	26	–	–	29	3	4	1	1	–	–	9
Lake Constance area		51	1	1	53		25	23	2		–	50
Austria	–	2	–	1	3		–	–	–	–	1	1
Hungary and Italy	–	–	–	10	10		–	–	–	–	10	10
Total	4	116	1	13	134	4	38	39	3	13	11	108
B: Zutphen Librije	11	99	–	–	110	11	20	13	–		–	44
C: St Gall rebindings	–	129	–	–	129		14	41	–		–	55
Total overall	15	344	1	13	373	15	72	93	3	13	11	207
Percentage	4.0	92.2	0.3	3.5	100.0	7.3	34.8	44.9	1.4	6.3	5.3	100.0

* For the headings see Figure 9.33

** includes Rhineland and Westphalia

9.9 COVERING

Leather remained the major covering material of late medieval bindings, although precious textiles were used more often than their scarce remains suggest; parchment as a covering material is infrequent, except for limp bindings (see Chapter 10), and for bindings in boards from the second half of the sixteenth century onwards. The kinds of leather used for covering show a greater variety than was the case on romanesque bindings. Chamois leather had become less frequent and seems to have been replaced by its imitation, namely reversed wool sheep of the whittawed or oil-tanned variety. Vegetable-tanned calf and alum-tawed pigskin are becoming more prevalent, the latter especially north of the Alps. The leathers listed in Table 9.14 have been identified on the basis of their surface structure, and more specifically on the hair follicle pattern.

Photographs of the four most typical leathers are given in Figure 9.34; however, experience is required to identify old leathers since the wear and tear of centuries often alters the characteristics. This is notably true for the dense and fine follicle pattern of calf which may become totally unrecognizable through scuffing and the common early use of varnish. Although wool sheep leather is particularly easily scuffed, often resulting in loss of the upper reticular layer, its follicle pattern will still be visible; in fact, this type of damage is

Table 9.14 Leather coverings of gothic bindings

Group	*Chamois*	*Wool sheep*				*Goat and hair sheep*	*Calf*	*Pigskin*	*Total of bindings*
		reversed	*white*	*pink*	*brown*				
A: England	1	3	10	6	1	1	1	–	23
Netherlands*	–	–	1	–	6	–	11	3	21
North Germany	1	–	–	2	2	–	8	7	20
South Germany	7	4	2	1	5	1	2	5	27
Lake Constance area	4	3	33	3	2	1	–	1	47
Austria Hungary Italy	1	–	1	–	7	4	2	1	16
B: Zutphen Librije	–	–	–	–	–	–	109	1	110
C: St Gall rebindings	13	47	3	–	–	1	–	62	126
Total	27	57	50	12	23	8	133	80	390
Percentage	6.8	14.4	12.7	3.0	5.8	2.0	33.7	21.5	99.9

* including Rhineland and Westphalia

a distinct clue to its identification (Figure 9.34[a]). The distinction between wool sheep and hair sheep is notoriously difficult, since a wide variety of different goat and hair sheep species had been employed in the past in the leather manufacture (see also Chapter 1, note 4, Chapter 7, note 16, Chapter 8, notes 13 and 14). The complexity of leather identification sufficiently explains why much data on leathers in the literature are unreliable.

Coverings are often mentioned in medieval accounts, library catalogues and inventories, but such mention is often restricted to colours: '*in rubeo, in viridi, in nigro, in albo, in croceo, in semicroceo*'. Sometimes greater details may be given in accounts of binders who knew their materials well: the accounts of Baldassarre Scariglia, binder at the Court of Naples, which date from between 1481 and 1491, specify, for example, '*cuio di Cordova, corduano negro, pelle vermiglie turchescho, pelli rosse di cordovano di Constantinopoli*', leaving little doubt about the popularity in Italy of goat (or hair sheep) imported from Spain and from the Levant (De Marinis 1960 vol. 1, pp. 4–5). The inventory of Duke Borso d'Este of Ferrara from 1467 lists a collection of 136 volumes, of which 108 are bound in leather; 58 of these are of '*montanina*' (or '*montonina*'), probably sheep (mostly '*alba*' or '*rubea*'), 25 are covered in '*coreo*', mostly '*rubeo*' but also '*albo*' (calf according to De Marinis), and seven in '*corio braxilio rubeo*' (interpreted as goat). Eighteen bindings are half-bound with leather backs; the remainder are described as '*cum tabulis nudis*', '*sine tabulis*' or '*in carta pecudina*' (De Marinis 1960 vol. 2, pp. 35–41).

At the same time the library of a lady of high rank might have looked different: De Marinis (1960 vol. 2, pp. 42–3) cites the 1493 inventory of Eleonora, daughter of Ferdinand I of Aragon, who left Naples for Ferrara to marry Ercole d'Este. It contains 64 volumes, 35 bound in leather (including five in half-leather), 26 in precious fabrics such as '*brocato*', '*raso alexandrino*', '*tabilionato*', but mostly '*veluto*'; 14 bindings are specified with

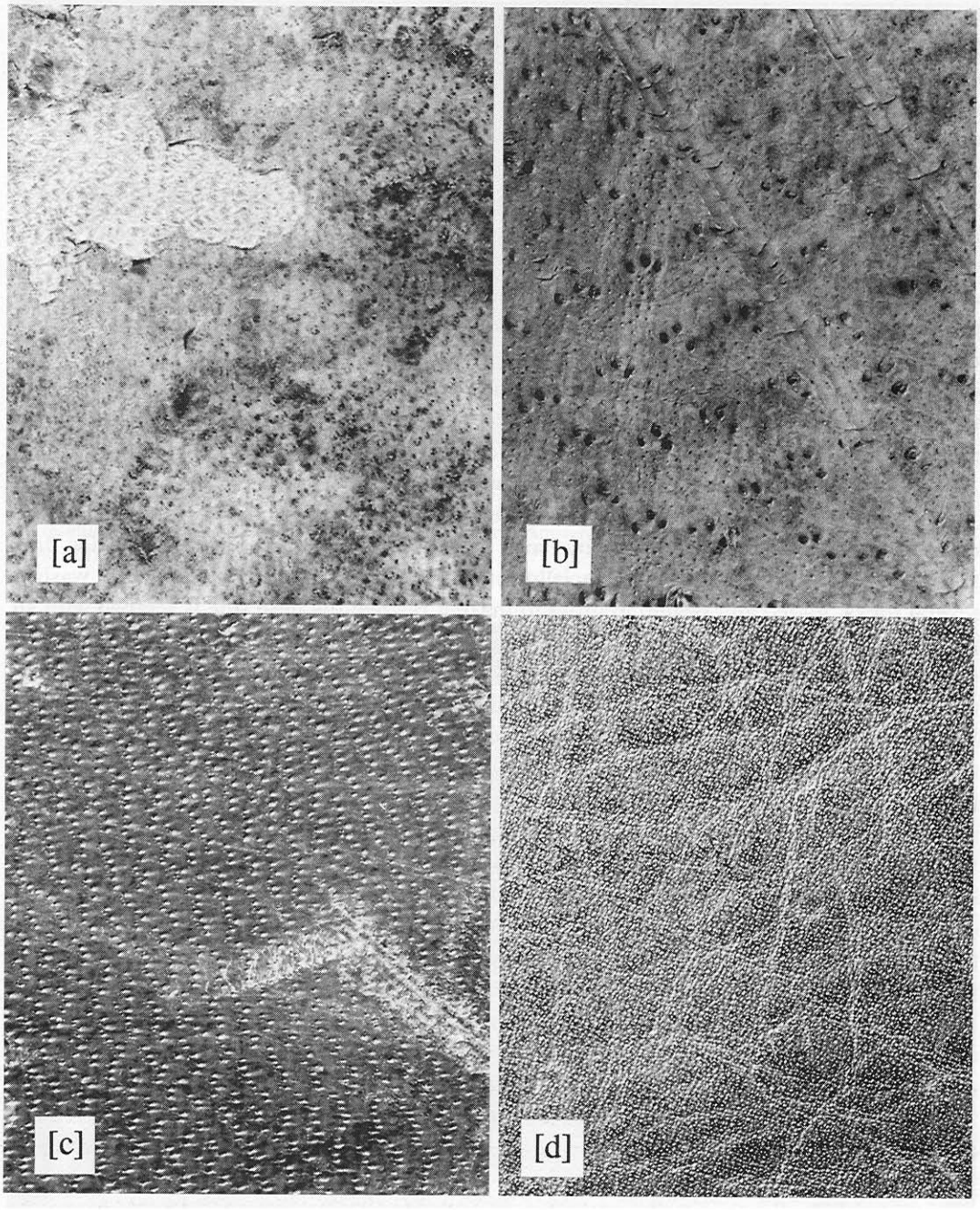


Figure 9.34 Surface structure of leather coverings on gothic bindings: [a], alum-tawed (?) wool sheep (SG Cod. 57, s. xiii, rebound s. xv^2); [b], alum-tawed pigskin (SG Cod. 561, s. xi, rebound between 1436 and 1461); [c], vegetable-tanned hair sheep (SG Cod. 173, s. ix, rebound between 1436 and 1461); [d], vegetable-tanned calf (Amsterdam UB Inc. 50, Paris imprint of 1497). Magnification: 2.1 times.

an additional second covering ('*sopracoperta*'), always made of textile (see below). Evidently precious textiles were favoured by royalty: out of 110 extant original Corvinian bindings 81 are covered with leather and 29 with textiles, mostly of velvet (Csapodi and Csapodi-Gárdonyi 1969). Inventories of the French court are a rich source of elaborate descriptions of exquisite textile coverings, such as '*baudequin à branches de violettes blanches et vermeilles à feuillages et champ noir*' and '*velours vermeil figuré à tiges vertes et roses blanches*'. Many such examples and sources are found in Laffitte's review (1989), which also gives terms for leathers and their decoration. Even more precious, since they were often embellished with embroidery, were some of the bindings for members of the English royalty; for archival sources and some surviving examples see Prideaux (1893 pp. 140–99), Brassington (1894 pp. 167–72), Davenport (1899), Plomer (1902–4), Middleton (1963 pp. 122–4), Barber (1971) and Foot (1992 pp. 23–4, 31 and 41–2) and Nixon and Foot (1992 p. 23, 31 and 42). But even less pretentious books had textile coverings, sometimes patterned linen as on the French binding PML 62834 dated 1486 (Needham 1979 pp. 105–8), or linen with printed figures on a fifteenth-century manuscript from Bavaria (BSB Clm 7725; Geldner 1975); several more such bindings are listed by Miner (1957 pp. 48–52).

The preparation for covering with leather seemingly included its moistening and cleaning of the flesh side, as advised by Faust (1612 pp. 80–9) for calf and pigskin. De Bray (1658 p. 30) recommends this especially for calf and stresses that it should be washed several times, folded and beaten in order to make it pliable; the flesh side is scraped with an iron.[37] The importance of moistening the leather adequately is emphasized by Zeidler (1708 p. 124) and Prediger (1741 vol. 1, p. 122); the latter recommends, especially for calf, to soak it first in water, to wring it out and to stretch it, with another person, '*wie das Frauen-Volck die Wäsche*'. De Bray also instructs the binder 'cut the edges thin with a knife'; this edge paring, also advised by Zeidler (1708 p. 124) and Prediger (1741 vol. 1, p. 122), is probably a later practice, for I have seldom seen edges pared on the flesh side before the mid-sixteenth century.

It is generally assumed that paste was used as adhesive for the covering of leather bindings; findings of traces of what could be flour on detached leather coverings, especially on the spine, seem to confirm this. Yet, one of the earliest recipes for adhesives (Faust 1612 p. 81 ff.), contains a mixture of paste from rye flour with animal glue. Faust details its use for covering a binding with pigskin: first the flesh side is moistened with water and the leather is rolled up and left for an hour for thorough dampening; then it is pasted with the adhesive, which is left to soak in for 'two or three paternosters'. Finally, with a second application of the mixture the leather is drawn over the boards and spine, the latter having received extra paste. Faust's manual refers also to covering books with white calf, white sheepskin and velvet.

Obviously, the detailed instructions for making leather pliable must have had good reason, and indeed occasionally marks can be found indicating that considerable force was required to draw the leather over the boards in order to have it adhere properly. Marks which might have been caused by some mechanical means, possibly a folder or thumbnail, used to draw the leather can sometimes be observed on turn-ins (Figure 9.35). The practice of cutting V-shaped notches at regular intervals into the turn-ins (Figure 9.36) is less intelli-

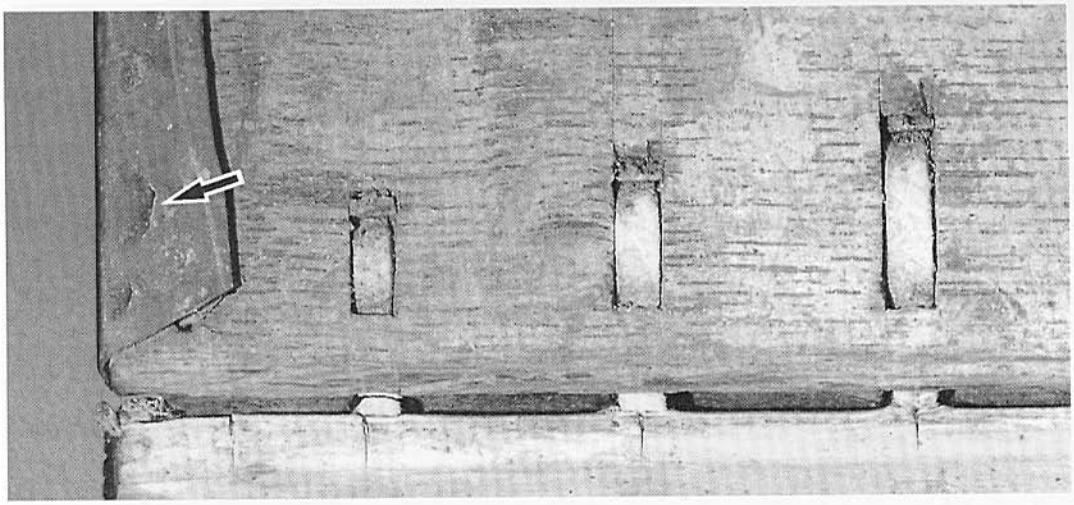


Figure 9.35 Marks left by some mechanical means (folder, thumbnail?) on the turn-in (arrow), employed to draw the leather over the boards; note also the staggered disposition of the lacing paths, the cut sewing holes and the residues of the paste left on the inner face of the board (Amsterdam UB I G 18; parchment manuscript from 1448; calf).

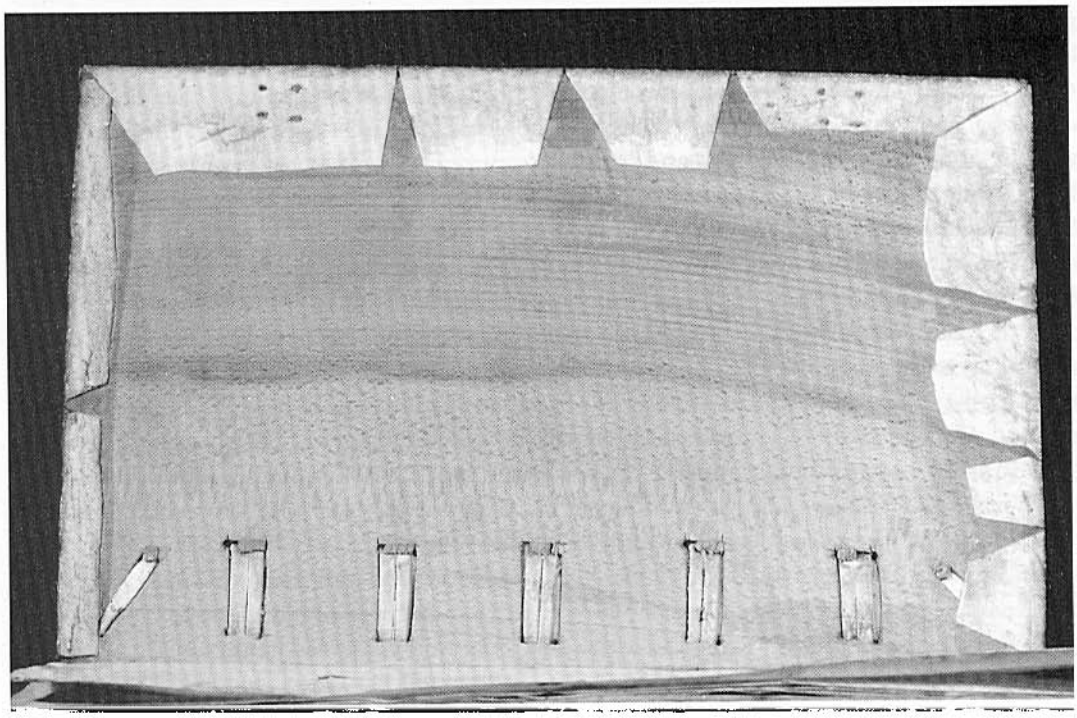


Figure 9.36 V-shaped notches cut into the turn-ins; note also the equidistant pattern of the support slips, fixed with wedges (attachment type [a], disposition [B] of Figure 9.33; SG Cod. 334, s. viii, rebound between 1436 and 1461; pigskin).

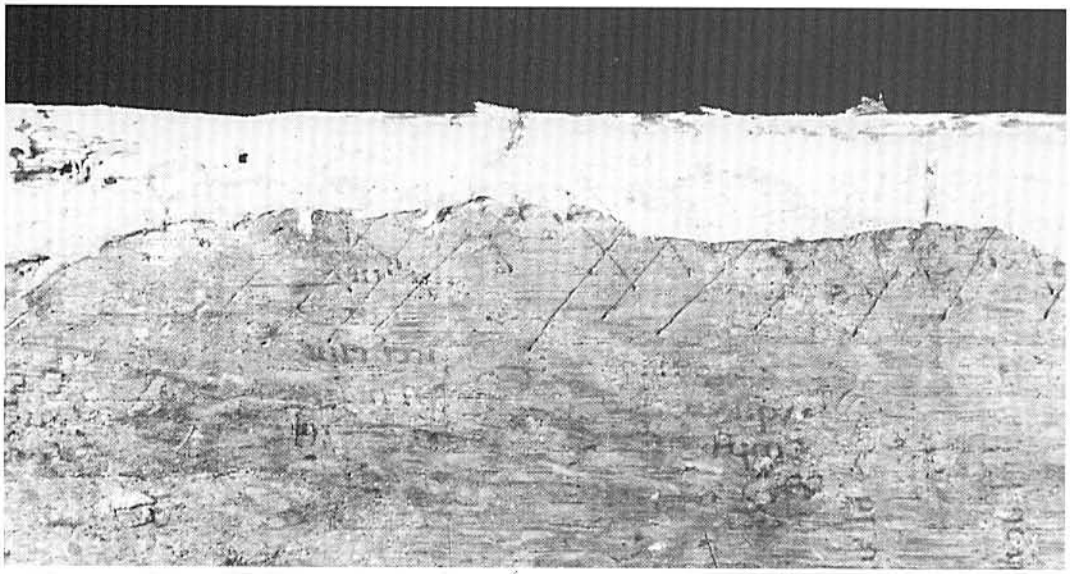


Figure 9.37 Cross-hatching over the turn-in area at the board to improve adhesion of the leather (SG Cod. 574, s. ix, rebound between 1436 and 1461; sheep).

gible; possibly forceful pulling of the leather had stretched it and any superfluous material had to be taken out in order to ensure uncreased and smooth turn-ins. Giovannini (1991 p. 46) interprets these notches as a consequence of the stiffness of unpared leather.[38] I have observed such notches in 29 out of the total of 410 leather bindings; the majority (15) are pigskin, though white sheep (9) and calf (5) occurred also. Most cases (18) are from the Lake Constance area, ten from the Low Countries, the Rhineland and Westphalia, and one from England (Bodley Auct. D.1.10: a manuscript from the Augustine abbey of Missenden, s. xii/xiii, rebound in s. xv). Notches in the turn-ins were observed on byzantine bindings from Patmos and the Peloponnese (see section 6.8).

Finally, marks indicating efforts to improve the adhesion of the leather covering should be mentioned: the turn-in area of the inner face of the boards would be roughened by cross-hatched scratches to ensure a better 'grip' of the adhesive (Figure 9.37); this method was obviously used for the outer face of the boards also, as can be seen in Gottlieb (1910 pl. 69) where a defect in the covering of a cuir-ciselé binding discloses the cross-hatching (ÖNB Cod. hebr. 2, a manuscript dated 1392). Similar cross-hatching was observed and interpreted as a means of improving adhesion on bindings from the Dominicans in Nuremberg (Bock 1928). This procedure was also used with materials other than leather, for example on the inner side of ivory panels to be mounted on wooden covers (SG Cod. 60; see Duft and Schnyder 1984 pl. III) or on wax tablets (Büll 1968 p. 787, fig. 603).

* * *

The turn-ins of the corners could be determined in 288 cases only, some 70 per cent of the

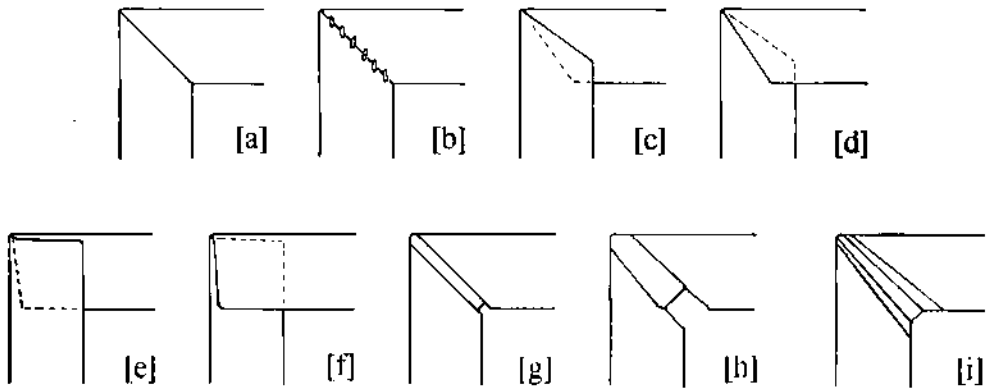


Figure 9.38 Variants of corner turn-ins in gothic bindings (based on the observations in Groups A, B and C). The main types are: mitred [a] and [b]; overlapping [c] to [f]; tongued [g] to [i] (for quantitative data see Table 9.15).

total of 410 bindings studied. The various types shown in Figure 9.38 are practically identical with those observed on carolingian (see Figure 7.29) and romanesque bindings (see Figure 8.18), except for the disuse of trenails. There is a substantial increase in the tongued types, which had already occurred on byzantine bindings (see Figure 6.14). Table 9.15 displays the geographical spread of the various types. The mitred corner [a] had remained dominant notably in the Lake Constance area; the tongued types [g] to [i] prevailed in England and the Netherlands. Comparing corners [a] and [g] on bindings from these two countries with the remainder of the Continent using the chi-square test has revealed a sig-

Table 9.15 Corner turn-ins on gothic bindings. For the headings see Figure 9.38

Group	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*Total*
A: England	4		2	–	–	–	12	–	–	18
Netherlands*	4	1	1	1	–	–	14	–	1	22
North Germany	2	–	1	–	–	–	2	–	–	5
South Germany	7	–	2	1	2	–	–	–	–	12
Lake Constance area	29	2	1	4	5	4	7	2	–	54
Others **	10	–	3	–	–	–	2	1	–	16
B: Zutphen Librije	**32**	**–**	**2**	**–**	**–**	**–**	**42**	**14**	**5**	**95**
C: St Gall rebindings	**44**	**–**	**7**	**9**	**2**	**2**	**2**	**–**	**–**	**66**
Total	132	3	19	15	9	6	81	17	6	288
Percentage	48.5	1.0	6.6	5.2	3.1	2.1	28.1	5.9	2.1	99.9

* including Rhineland/Westphalia

** Austria, Hungary, Italy and France

nificant difference (χ = 7.6), underlining another common trend in England and the Netherlands. Neither chronological differences nor any evident relationship with the kind of leather used were found in this distribution.

A characteristic feature of gothic bindings is their rounded back with raised double sewing supports (bands). In order to achieve optimal adhesion of the leather covering to the spine, the binder would 'tie up' the bands, that is, draw a thin cord at either side of the raised supports (and often also between the two parts of the double support). To this end the book was placed in the hand press between tying-up boards; the pegs along the edge of the latter served to anchor the cord while passing over the back. This procedure is described by Faust (1612 p. 30–3) and de Bray (1658 p. 32), who also provides an illustration of the procedure and of a pair of tying-up boards (p. 46, fig. *mm*). Of the 410 bindings studied, 211 had cord marks; as mentioned above, these are usually alongside the bands and often also over their middle, but sometimes, notably on bindings from the Low Countries, closely spaced cord marks run across the head and tail panels of the back, sparing the site of the link-stitch change-over. Bands without cord marks were found on 159 bindings, only eight having a smooth back; in 32 cases the original state of the back could not be established. The earliest tying-up marks occur on a paper manuscript dated 1398 (SG Cod. 996).

* * *

It seems that staining the leather was, at least partly, the task of the binder; according to some early instructions he would perform this after completion of the covering. Faust (1612 pp. 35ff.) gives a number of recipes for staining sheep and calf leather, utilizing materials like sap green, saffron, brazil wood and irongall ink; alum was usually required as mordant. De Bray (1658 p. 32) gives instructions on staining the leather red with brazil wood and black with 'shoemaker's black', presumably an irongall compound. Medieval recipes for staining leather on books are provided in the *Liber illuministarum* (the 'Tegernsee manuscript', BSB Cgm 821, dating from *c.* 1500); Rockinger (1872 p. 205ff.) cites some of them and lists, in addition to the pigments mentioned above, verdigris, a mixed ink of carbon and irongall and ingredients such as chalk, vitriol, lye and gum water. The staining procedures described in BL Sloane 345, also dating from *c.* 1500 and published by Braekman (1975 pp. 173–81), are meant to be applied to whole skins, such as preparing white calf and staining it red with brazil wood or madder. For the principles of these procedures see Thompson (1936).

Inspection of the turn-ins can reveal whether staining was done before or after covering, as the part lying under the pastedown in the latter case would usually remain unstained – or, alternatively, the board edge and turn-in area would be stained black. The edges of the leather covering were mostly left as cut from the skin, sometimes quite irregular; as a rule, fifteenth-century bindings show no signs of edge paring. Paring away the grain side before affixing the pastedown had become a regular feature in the sixteenth century and was observed on *c.* 70 per cent of the Zutphen Librije bindings (Figure 9.39); yet, it was practised earlier: I first noticed it on a pigskin binding of a paper manuscript of 1432 (SG Cod. 448). I have observed the earliest edge paring from the

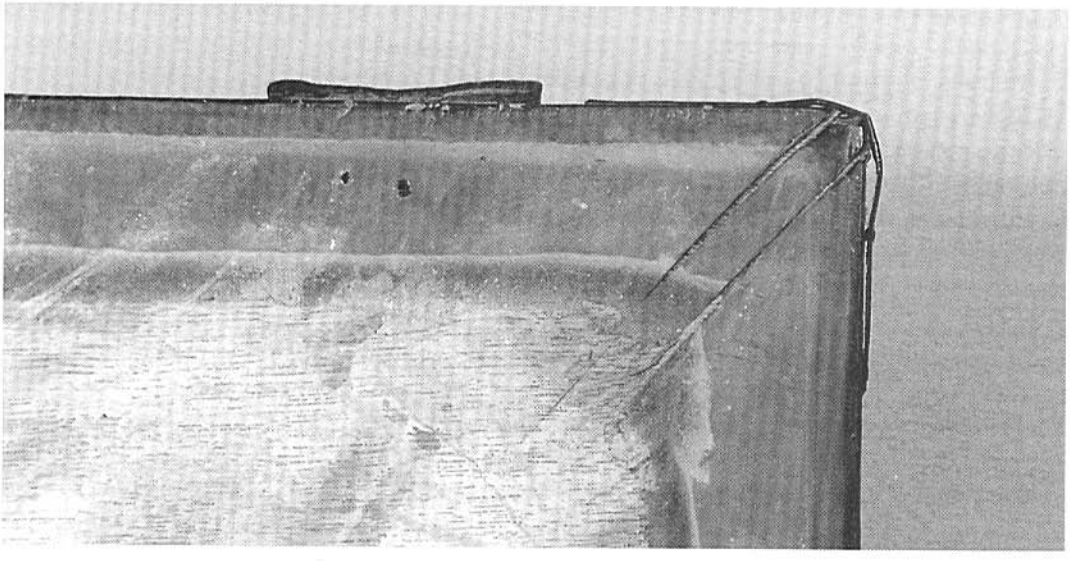


Figure 9.39 Pared grain side of the leather turn-ins, evidently done after covering; note the single-tongued corner turn-in and white remnants of paste used to fix the (now loose) pastedown (Libr. M 117, Basle imprint of 1530).

flesh side on Corvinian bindings from about 1470 and on French bindings from around 1525.

Full leather covering of gothic bindings with wooden boards was the rule, but there are many instances of modest bindings with the leather covering only one third of the boards. Six out of 126 St Gall rebindings (Table 9.14) are such half-bindings of chamois leather, the edges of the covering additionally held down with a few iron nails; for the covering of one of them (SG Cod. 276) several pieces of leather had been stitched together. Very likely economy was the reason for such modest covering, like the mid-fifteenth century rebindings of the Würzburg Dombibliothek in half-pigskin (example: Würzburg UB Mp.th.f. 5). Nevertheless, some half-leather bindings are indeed elaborately decorated, like three cuir-ciselé bindings from Bohemia, dating from the late fifteenth century (Hamanová 1959 pp. 40–2, figs 19–21, and 25); she also refers to a half-binding, dated 1522 and decorated with ornamental rolls and with the title cut in the plain wooden board. Nuska (1965 p. 36) affirms the regular occurrence of half-leather bindings in Bohemia, blind- or gold-tooled, mostly from the early sixteenth century. A. Hobson (1989 p. 239, fig. 188) describes two German half-bindings of pigskin decorated with blind-tooled medallions and rolls, dating from about 1538. In Carvin's French material (1988 p. 91) '*il y avait des cas de demi-reliures*', but their frequency is not stated; the earliest example observed dates from the first half of the fifteenth century. Archival evidence indicates that half-bindings were not uncommon in Italy, not even in prestigious libraries: the 1455 inventory of the library of Pope Nicholas V lists two volumes as '*semicopertum coreo vermillo*, and [. . .] *aluta crocea*' (De Marinis 1960 vol. 1, p. 30); that of Borso d'Este of Ferrara, made in 1467 and comprising 136 volumes, names 18 half-bindings ('*cum fundello rubeo, cum montanina alba,*

crocea, viridi'; De Marinis 1960 vol. 2, pp. 35–41). Laffitte (1989) refers to terms '*coopertum pro dimidio corio*', '*cum fondo corii, cum postibus semi-nudis*', found in various Italian, Portuguese and French inventories, the earliest dating from 1344.

* * *

In addition to the customary covering described above, gothic bindings display several modifications. One of these is the overcover, not unlike those on romanesque bindings, consisting of an additional secondary covering (see section 8.10, Figures 8.21 and 8.22). Yet there are other variants: instead of being turned in all over, the leather covering may protrude over one or more of the board edges; a secondary covering, either of leather or textile, may likewise protrude over one or more of the edges, or, in contrast, be restricted only to the back of the book. These variants may occur in different combinations, which is one of the reasons why in the past the classification of these special forms was somewhat confused.[39] Without claiming to resolve all ambiguities, it is proposed to distinguish the following main categories: (a) protective overcover of leather, (b) overcover of precious textiles (also termed 'chemise'), (c) overcover adopted to facilitate carrying the book (girdle book) and (d) partial overcover restricted to the back ('overback'). As will be evident from the literary data and examination of the structure of extant originals, a clear distinction between the four types is not always feasible; there are considerable differences notably in the extent of the primary covering, which might constitute anything between a full leather covering and one or more strips of leather covering the edges.

Lack of clarity started with Wattenbach (1871 pp. 230–1) who drew attention to the occurrence of overcovers in inventories from as early as the fourteenth century, but had failed to decide whether the terms *camisia* or *chemise* referred to precious fabrics or leather. Prideaux (1893 pl. 107) and Brassington (1894 pp. 211–12) were the first to describe a textile chemise binding on the Book of Hours for Queen Mary I (now in Stonyhurst College). Loubier (1904 p. 45) briefly mentions representations of such bindings in Flemish paintings; in a later study (1917) he introduces the term *Hülleneinband* ['wrapper binding'] and describes six extant originals and another 24 examples in paintings, comprising both textile and leather overcovers. The distinction between these and the girdle books was the subject of some discussion, mainly considering aspects such as physical protection, devotional purposes or portability (Loubier 1924; Schreiber 1939a; 1939b; 1940; Rhein 1960; U. Bruckner 1997). This discussion was unclear, partly due to the uncertainty in interpreting pictorial representations. The latter is acknowledged by Storm van Leeuwen (1989), who recently reviewed the subject. He counted 222 representations in art between 1425 and 1550 (regretfully no list is given), but in 145 of these it was impossible to decide whether leather or fabric was the covering material; similarly, other technical details remain obscure. He describes in detail seven extant textile chemise bindings (including a recent acquisition, The Hague KB 135 J 55) and 49 extant leather overcovers. Another six extant chemise bindings are documented by Bearman (1996a), in addition to another 20 with leather overcovers; he also pays attention to representations in visual arts and discusses the significance of the chemise in relation to the venerable practice of draping and covering the hands while handling sacred books. The corpus of extant chemise bindings can be brought

to 14 by adding the Psalter of Blanche de Castille (De Hamel 1984 p. 77; Coron and Lefèvre 1995 p. 48).

Out of the 14 extant chemise bindings seven contain legal or administrative documents (for example, several copies of the Foundation Indentures of Henry VII's Chapel, Westminster Abbey, 1504; BL Harley 1498, PRO E. 33/1 and PRO E. 33/2), five are on Psalters and Books of Hours (examples: The Hague KB 135 J 55, Baltimore WAG MS 294), the remainder cover secular works. Most of them originate from England (nine), from France and Spain (two each) and one comes from Italy. Their construction varies: four have a primary covering of (decorated) leather, another four one of damask, three have none (that is, the chemise is put on as a loose *'liseuse'*, from which the book can easily be removed), the construction of another three is unknown. The books themselves vary in dimensions from small books of 105 × 75 mm (Stonyhurst College) to sizeable volumes of 425 × 290 mm (Madrid BN Vitr. 11–8); the chemise can protrude the edges by no more than 25 mm (The Hague KB 135 J 55), but even may have extreme dimensions of 970 × 930 mm (BNF Arsenal MS 1186 Rés.).

To the group of extant chemise bindings a few cases should be added where remains of textile prove that they originally had a chemise, like The Hague KB 135 J 8 (Storm van Leeuwen 1989), two Spanish bindings described by Thomas (1939 pl. xii, xvi) and BL Add. 49.999 (see note 12). Another example of documentary evidence for an earlier chemise binding is Leuven, Library Theological Faculty MS Mechl. 1, an illuminated Bible made in Naples in the late fourteenth century for Robert d'Anjou, rebound several times.[40] Inventories testify that chemise bindings were cherished by ladies of nobility: no less than 14 of the 64 bindings of the aforementioned Eleonora, wife of Ercole d'Este, according to the already mentioned 1493 inventory, had a *sopracoperta* of *brocato, raso, tabilionato* or *veluto* (De Marinis 1960 vol. 2, pp. 42–3). Seven of these had a primary covering of textile, the others of leather. Descriptions of chemise bindings abound in the detailed library catalogues of Charles V (Delisle 1907). The fact that many chemise bindings had a decorated primary leather covering, suggests the possibility that chemises had often been a later addition.

Although the data are fragmentary, it appears that the leather type of overcover represents the largest category, with at least 75 reported examples. One of its variants seems to be a continuation of the romanesque overcover (see Figures 8.21 and 8.22) and characteristic of relatively heavy volumes. It is an overcover of chamois leather (at times also calf) protruding over all three edges, with long-strap fastenings and protective furnishings. Many of these bindings are on service books: of the 16 Bohemian examples mentioned by Hamanová (1959 pp. 61–4, figs 38, 41 to 43) 12 are Missals and Bibles, mostly dating from the early fifteenth century; the Hague KB 78 A 29, a Bible from *c.* 1400 from the Maastricht area is similar. Others contain small religious texts, like the binding of a Cistercian Diurnal and a Breviary (Hamanová 1959 figs 39 and 40), measuring only 113 × 70 mm. Intermediate in size and of variable contents are books which belonged to monasteries, private libraries or secular authorities; examples are Graz UB MS 826 (s. xiii, from the Benedictine abbey Millstatt, Austria, rebound between 1430 and 1450), Erfurt WAB MS Ca f. 249 (one of the *Hülleneinbände* of the Amplonian collection, s. xiv, restored in

1986; see U. Bruckner 1997) and Bremen UB MS a. 30 (a law text of the City Council dating from 1417; see Schunke 1931 p. 492, fig. 1). Such bindings were also used for official records books, such as a volume with land tax records from Isny (Bavaria), dating from 1477, with an irregularly shaped overcover. Although it is originally described as a *Beutelbuch*, it appears most unlikely that with its weight of 3520 grams it had been intended to be carried on the girdle (Klauser 1963; see also Szirmai 1990a). Administrative records also form the content of several English examples (Bearman 1996a), but unfortunately many of these are now mainly empty covers, kept separately from the newly bound contents. All examples of girdle books described above are on manuscripts, but they also occur on printed books, such as the theological works by Brother Lucas of 1524 (Hamanová 1959 p. 63, fig. 43).

There is a diversity in the technical construction of the overcovers: in many instances there is a full primary covering to which the second covering is stitched or fixed with adhesive and/or with metal furnishings (this applies to most of the Bohemian examples as well as to The Hague KB 78 A 29). In other cases only the free edges of the boards are lined with leather strips to which the overcover is attached by stitching and/or adhesive; this seems to hold for the Amplonian collection in Erfurt and for Düsseldorf KM Inv. no. 11223 (Adam 1919). The dimensions and shape of the protruding flaps can vary greatly; sometimes a whole skin is used with its irregular shape, a case in point being the already mentioned Isny binding and some Bohemian ones. It should be carefully ascertained whether the overcover is contemporary with the original binding or not; if the primary covering carries decoration or a title, the overcover is likely to have been added at a later stage. Bodley MS e Mus. 155 stands out as an example of a binding with an overcover that was applied in order to cover a damaged primary covering.

Protection of the edges of the book was one of the main purposes of overcovers; the most minimal measure to this are flaps on the primary leather covering as practised in several Nuremberg monasteries. In the Dominican workshop in Nuremberg, active between 1433 and 1522, it was customary to leave the leather covering of the upper cover larger to make a top-edge flap, or that of the lower cover for a fore-edge flap; similarly, between 1464 and 1526 the Augustinians protected the top edge of their bindings with a separate piece of leather (Bock 1928 fig. 1; Kyriss 1940 p. 33, 46).

* * *

Another particular form of late medieval bindings was the girdle book, apparently very popular as testified by hundreds of representations in the visual arts. Glauning (1926), knowing of no more than 14 originals, compiled a list of 160 cases in paintings, sculptures or in graphic art; his list was expanded to 477 by L. and H. Alker (1966) and by others during the 1990s to some 560 (for references see Szirmai 1990a). Oppitz (1993; 1995) extended these observations to about 700, Merkl (1997) brought the total to 813.[41] Most owners or carriers of girdle books are biblical figures or clergymen: about one third are Apostles (John the Evangelist scoring highest, followed by Peter, Paul and James), Saints (St Jerome, St Catherine), or monks and nuns. The majority (*c.* two thirds) hold the book in the fist by its pouch, only some 12 per cent have it hanging from their girdle (others are

lying on a table, etc.); in about half of the girdle books the pouch has loose ends, about one quarter being provided with a knot, only one having a hook. The representations cover a period from about 1400 to 1600, with a slight predominance (*c.* 60 per cent) during the fifteenth century; the Germanic countries provide the lion's share, but France, Spain, Italy, Scandinavia and England are also represented.

Most of the 23 original extant girdle books (for the most recent corpus see U. Bruckner 1995) contain religious works, four legal texts; 11 cover manuscripts on parchment, seven cover manuscripts on paper, five are on printed works. Most of them (19) originate from the fifteenth century; the earliest datable example is New York Public Library Spencer MS 39, written in 1454 in Kastl, Bavaria, the latest has a primary covering dated 1579 (Stockholm KB MS C 109). In contrast to those represented in art, the majority of the originals (16) have a knot at the end of the pouch, the so-called Turk's head, an endless wreath of a three-thong braid (Grant 1972 pp. 354ff.). Three of the pouches have hinged brass hooks, another occurred on an example that has now disappeared (U. Bruckner 1995 no. 2; see Szirmai 1988a fig. 9). A virtually identical hinged hook was described as a '*Hakenband*' (hook binding) without a pouch, mounted directly onto the tail edge of the lower board (Alschner 1984). Only two extant girdle books belong to the category of a pouch with loose ends (Berlin SBPK MS lat. oct. 217 and Göteborg Röhsska Konstsslöjdmuseet Inv. no. 519–15; see Szirmai 1990a). Most coverings are utilitarian in character: 14 are made of simple unadorned chamois leather, seven are of brown calf or sheep with minimal blind tooling, two (Toruń UL Ob.6. 14498–4500 and Quarnfors Wistrand collection) have a pretentious velvet covering, the former with silver furnishings.[42] Another rather luxurious girdle book is Nuremberg GNM MS 17231, dating from 1471 with furnishings that carry the coat of arms of the Nuremberg patrician family of Kress, the very first girdle book to be published upon (Anon. 1862; Figure 9.40). The majority of the girdle books with devotional content are small and light volumes which indeed could easily be carried on the girdle (mean weight of 15 examples is 490 g, ranging from 132 to 900 g). The four girdle books on legal texts represent a category on their own, as they tend to be larger in size: the largest, BSB Cgm 8950, measures 292 × 204 mm and weighs 1624 grams; it has a split pouch and would have been carried as a shoulder bag rather than at the girdle.

Fourteen of the 23 extant girdle books have only a single (primary) covering whose extension, ordinarily at the tail, forms the pouch; for further protection the covering may also protrude at the head and front edges. Any edge of the boards left uncovered by the protruding covering received a narrow edging strip. Girdle books with this type of primary covering were obviously genuine and bound as such from the outset, such as, for example, Erlangen UB MS B 17, Halle ULB ThSGV 3148, BSB Clm 19309, Nuremberg GNM MS 17231 and The Hague MMW 1 F 50. Nine of the 23 extant girdle books have a secondary covering, applied over a seemingly complete primary covering; to this group belong, among others, Göteborg Röhsska Konstslöjdmuseet Inv. no. 519–15, New Haven Yale UL MS 84, New York Public Library Spencer MS 39 and BSB Cgm 8950. Their construction may allow for the possibility that they were made into a girdle book at a later date; this is undoubtedly the case with Stockholm KB MS C 109, where the primary covering of brown

Figure 9.40 Girdle book from 1471, a Breviary written on parchment, commissioned by Hieronymus Kress, mayor of Nuremberg from 1452 to 1477. Covering of chamois leather, pouch ending in a leather knot; brass corner and centre pieces decorated with openwork tracery and engraving, underlaid with blue parchment; two brass all-metal fastenings, similarly decorated, clasps backed with red parchment, catch and anchor plates carrying the coat of arms of the Kress family (GNM MS 17231; 135 + 235 × 105 × 55 mm).

calf is meticulously decorated with panel stamps and rolls (dated 1579) and unlikely to have been intended to disappear underneath the secondary covering. Similar considerations may apply to BL Add. 15700, having at its tail a richly embroidered endband with gold threads, unlikely intended to be hidden under the pouch; also to Dessau SB Georg 276, ruined by several restorations, and to those in the Schäfer collection in Schweinfurt (probably a seventeenth-century imitation) and in the Quarnfors Wistrand collection;[43] the latter two differ as well in having the pouch extension at the head of the bookblock. Kremsmünster StfB CC 391 and Düsseldorf KM Inv. no. 8309, though genuine contemporary girdle books, have traces of a primary leather covering, indicating that they are probably not the first binding.

Most authors who have written about girdle books are eager to explain the small number of extant examples with the mere assertion that their pouch had been cut off when upright shelving was introduced. The only instance I have come across which supports this argument is SG Cod. 512, a paper manuscript of German Prayers dating from *c.* 1500 (dimensions 158 × 110 × 60 mm, weight 524 grams). It originally had a single covering which is now cut down to some 15 mm at the head and flush with the boards at the tail. Its brown covering (calf) has blind tooling which, like its furnishings and fastenings, is characteristic of Southern Germany.[44] Another rare find is that of a girdle book without its contents (London PRO E. 36/282; Bearman 1996a fig. 4), providing evidence that in England genuine girdle books must indeed have been used.[45]

* * *

Finally, there is a category where the overcover is reduced to the back and a narrow portion of the boards, the overback. It was first described by Gruel (1905 vol. 2 p. 66 with fig.) as '*dos préservateur*', supposedly meant to protect the primary covering '*des injures des temps*'. The binding described is undoubtedly from the Netherlands, since it is virtually identical with the over one hundred volumes which once belonged to the chained library in the Nieuwe Kerk (New Church) in Amsterdam from 1578 to 1632 (now in Amsterdam UB). The primary covering of these bindings is made of brown calf, blind-tooled, with the title and date (ranging from 1587 to 1603) tooled in gold on the upper cover. They are uniformly fitted with a standard set of brass corner and centre pieces on both boards (see below); the edges of the chamois overback are held down with half-round strips of brass nailed along the spine edge. The first catalogue of the Library, dated 1612, has its title page adorned with an engraving depicting such a binding (La Fontaine Verwey 1984 fig. 7); if a whole series of such overbacks had been commissioned, it was obviously a very purposeful decision.[46]

Bindings with such overbacks might have been used in other chained libraries in the Netherlands, but it was by no means a rule. The Zutphen Librije had the books bound without an overback, although it holds about 20 such bindings (Figure 9.41).[47] There are instances where the overback was very likely a repair of a damaged back, such as Libr. M 5 and M 6, fifteenth-century manuscripts with an overback of diced leather, characteristic of the nineteenth century.

The use of a protective overback was not restricted to the Netherlands. Oldham (1952 p. 9) thought that 'doeskin covering of the back fastened down by strips of brass

Figure 9.41 Lower cover of a binding with an overback of thick chamois leather with rounded tab-shaped extensions, held down by brass strips and corner guards. Five cast and turned bosses of bronze, iron heels at the tail edge of the covers, wrought iron chain attached with copper clip (Libr. M 453 a Cologne imprint of 1567, bound by the Brethren of Common Life in Doesburg; 360 × 230 × 120 mm).

[. . . was] used at times in England, Germany, perhaps the Netherlands'. In the chained library of the Royal Grammar School in Guildford chamois seems to have been employed for overbacks (Woodward and Christophers 1972, pl. IV). A. Hobson (1989 p. 18, fig.10) illustrates a guild book from Perugia, written in 1368 but rebound or repaired later, with an overback nailed down along the spine edge.

9.10 TECHNIQUES OF DECORATION

Whereas blind tooling had already reached a high standard on romanesque bindings, a wide array of new techniques appears on gothic bindings. The iconography and stylistic evolution are beyond the scope of this study, but the decorative techniques, rather meagrely documented, deserve at least some attention.

One of the most demanding techniques found on gothic bindings is *cuir-ciselé*. This technique, originally used by leatherworkers, perhaps inspired by the chased decoration of sheet metal, was used all over Europe on the most diverse sorts of objects and from the early fourteenth century to Napoleon's time. Yet its application on bookbinding seems mainly limited to the fifteenth century and, geographically, mainly to Germany, Austria and Bohemia, although there are a few examples from Spain, France, England and Italy. Schmidt-Künsemüller (1980; 1984) registered some 460 *cuir-ciselé* bindings, including 65 where the decoration is restricted to drawing with a pointed tool (*Lederzeichnungsbände*). The *cuir-ciselé* technique is not mentioned in the early manuals; possible references in inventories or accounts are ambiguous.[48]

After examining a number of *cuir-ciselé* bindings and carrying out practical experiments with this technique (Szirmai 1983) I suggest that the procedure was as follows: after covering (usually in calf, sometimes in goat or pigskin), the design is sketched onto the dampened surface with a blunt point (Figure 9.42[a]). The outlines of the objects (flowers, vineleaves, coats of arms, fabulous animals, etc.) are then cut into the leather surface with a pointed knife bevelled on both sides at a wide angle; the wide angle is required to prevent the blade from cutting too deeply into the leather, [b]. Then follows the most characteristic step, namely pressing down and texturing the background with repeated impressions of a

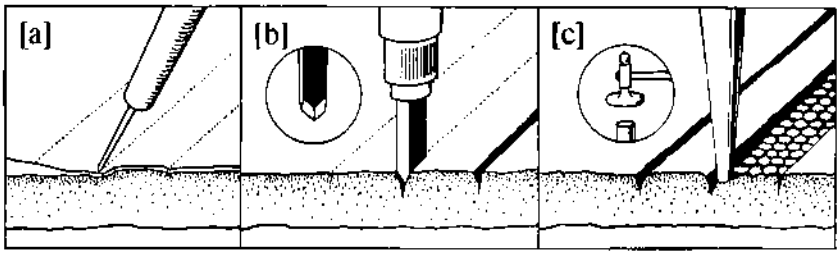


Figure 9.42 Principles of the *cuir-ciselé* technique: [a], outlining the design; [b], cutting the outlines with a pointed knife (inset) half-way the thickness of the leather; [c], texturing the background using a punch and chiselling hammer (inset); (modified from Szirmai 1983).

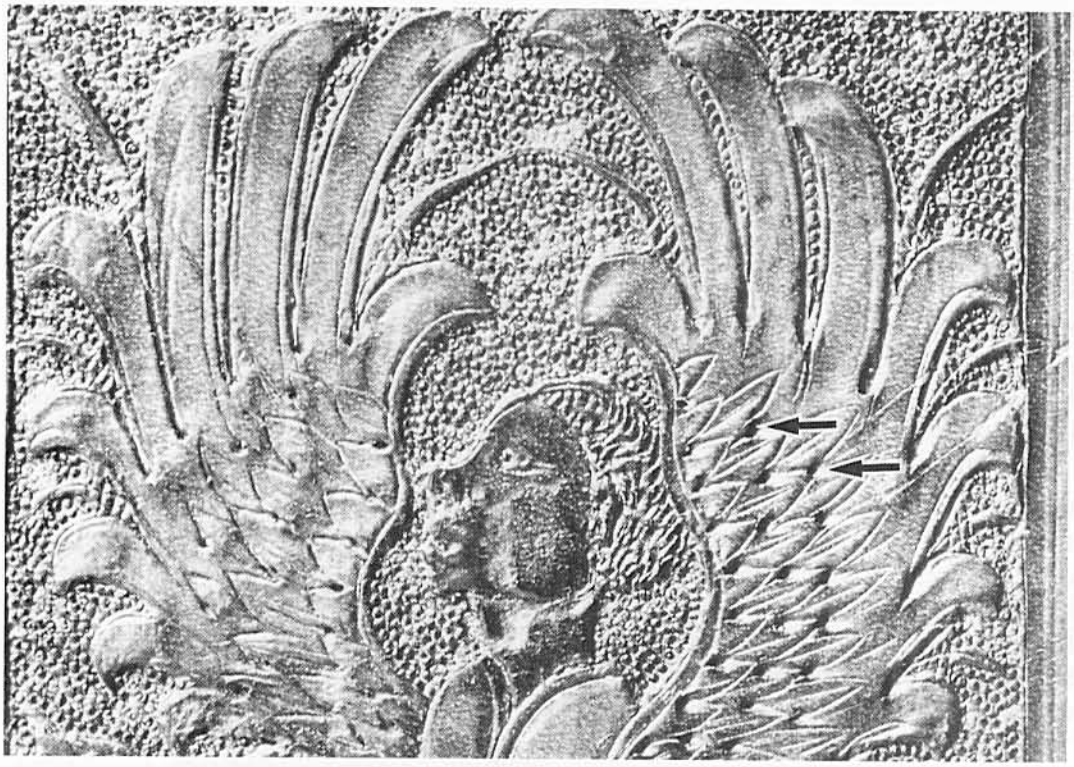


Figure 9.43 Detail of a cuir-ciselé binding, showing the coat of arms of Hans von Thil and his wife Klara von Imhof. Note that some parts were stained dark; holes (arrows) indicate that the surface had been lifted with a sharp point to enhance the relief (see D.-E. Petersen 1975 pp. 27–8; HAB 158. 3. Quod. 2°, Basle imprint of 1472, bound by Mair Jaffé in 1481).

matting punch, mostly a single pearl punch, using a chiselling hammer, [c]. The diameter of pearl punches on various original specimens varies from 0.7 to nearly 2 mm, which means that an area of 10 × 10 mm requires about a hundred strokes with the hammer; hence, the matting of one cover of an average size book would require some 45 000 strokes. This calculation demonstrates that this is an extremely laborious technique which also demands high artistic dexterity from the binder. There is indeed evidence that itinerant leather artists had offered their services to different binderies, like the '*Kremsmünstermeister*' whose hand can be traced in various Austrian monasteries. Several other artist binders have also been credited with a series of such bindings (see for details Goldschmidt 1928 pp. 72–82; Mazal 1970a pp. 10–11, figs 7–24; Schmidt-Künsemüller 1980 pp. xi–xvi; Foot 1991); part of a binding decorated by Mair Jaffé is shown in Figure 9.43. Attempts have been made to imitate such unique works of art and to produce them more expediently by using engravings that are of the same effect as the original *cuir-ciselé* technique but that can be quickly impressed with a blocking press (see for such bindings, which have been attributed to Johann Hagmeyer of Ulm, *c.* 1475–90, Geldner [1958 fig. 23] and Needham [1979 no. 23]). However, Hagmeyer's lifeless substitutes do not seem to have caught on.

* * *

Blind tooling was already well known and widely used on gothic bindings. It required a steady but not necessarily artistic hand, since the latter was lent by the tool cutter; yet it was time-consuming and the increased book production from the second half of the fifteenth century called for means to speed up the process. The invention of the ornamental roll and the introduction of printing blocks and panels are the results of such efforts. From the studies of Adam (1917–18), Rhein (1934), Goldschmidt (1928 p. 19–20), Schmidt (1928), Kyriss (1940) and Rozsondai (1974; 1978) this evolution can be illustrated with the following examples.

Initially, the popular floral diaper, enclosing a pomegranate fleuron, was composed with three different tools and a total of 13 impressions (Figure 9.44[a]); as the next step, the individual parts of the floral diapers were combined into two arches, [b], requiring no more than three impressions to achieve the same pattern. The last step of development, [c], was to cut the whole design into a single block which could be impressed quickly in a single operation (although requiring the use of a press). The rather popular border on the same type of bindings was composed of a rosette, alternating with a stamp of foliage climbing round a staff. Initially, two individual tools were needed, impressed in sequence to produce the border [d]; the next step was to combine the two into one stamp only, [e]. But the real gain came with the revolutionary invention of the roll, carrying the engraved design on its circumference, which then allowed for a continuous process, [f].

We know neither place and time nor the names of craftsmen to be credited with these inventions. Southern Germany was the likely scene, probably in the second half of the fifteenth century. Kyriss (1951–8) found, in his extensive studies of over 20 000 rubbings taken of blind-tooled decorations of gothic bindings from Southern Germany, spread over 186 workshops active between 1433 and 1555, ornamental rolls in about half the cases. The earliest recorded use of rolls is on bindings by Johann Richenbach made between 1467 and 1484; the earliest dated roll is from 1489 and has been ascribed to the Nuremberg Augustinians (Kyriss 1940 p. 47). Blocks of the type shown in Figure 9.44[c] were used in some ten workshops only, mostly in the Nuremberg area; again, among the earliest are those on bindings of the Nuremberg Augustinians (Kyriss 1951–8, workshop no. 19), active between 1467 and 1510.

There is some archival evidence concerning the tools for decoration. The 1483 inventory of Bamberg St Michael monastery (Bresslau 1896; Lehmann 1929–30) records 19 hand tools, six of them of iron ('*sex ferreas formulas sculptas*'). Ornamental rolls and panels appear in inventories somewhat later. Helwig (1941) reports that Lienhard zur Eich, a Nuremberg binder, had owned – according to his inventory of 1530 – '*neun Rollen (stempffredlein)*' and 14 '*Stempel*'. In Leipzig, in the inventory of binder Caspar Wagner of 1547 we find itemized '*xxxiiij stempfel*' and '*xxvij redlein stempfel*'; in that of seal cutter Peter Wolleben of 1569 '*10 grosse undt Kleine getrehette Rollen*', '*11 gross und Kleine gegustirte buchbinder stöcke*', '*15 gross und Kleine geschnittene Rollen*', '*3 Geschnittene buchbinderstöke*', suggesting that both rolls and blocks ('*stöcke*') were made by engraving (Kirchhoff 1889). From the 1578 inventory of the Leipzig binder Christoph Birck we learn that he had '*14 Eingefaste*

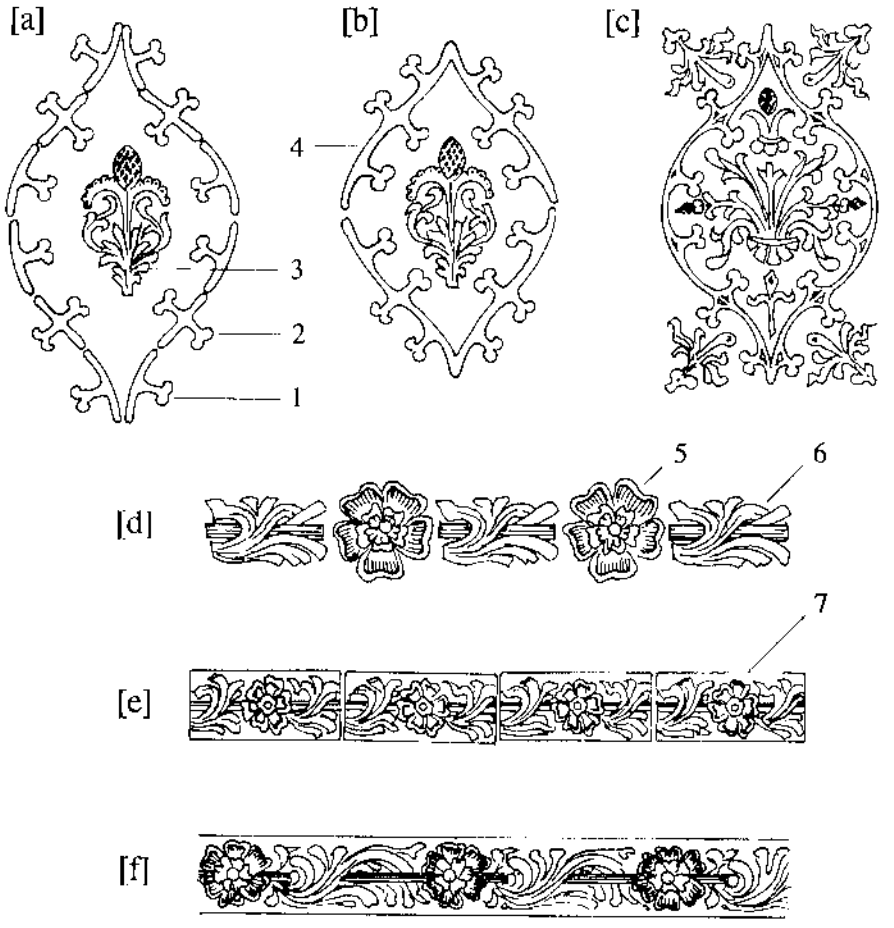


Figure 9.44 Diagram showing the evolution of the panel and the ornamental roll from single tools: [a], ornament composed of three different tools (1) to (3), requiring 13 individual impressions; [b], ornament requiring only two different tools (3) and (4) and three impressions; [c], ornament printed with the panel, requiring a single impression by the press; [d], border built up with two individual tools (5) and (6); [e], border built up with one single tool (7); [f], border impressed with the ornamental roll.

messene Rollen', '*9 Messene stöcke*' and, among his hand tools, '*3 Eisserne Kleine Stempfelgen*'. Finally, Kirchhoff (1889) mentions the 1592 inventory of Andreas Ficker, also a Leipzig binder, whose varied tool kit had contained blocks for printing in blind ('*lehderstöcke*'), engraved on one side ('*vff einer seite geschnitten*') or on both sides ('*vff beyden seiten*'). Two Cambridge inventories name 'a Roll to printe withall' (workshop of Nicholas Pilgrim, 1545) and 'two printes for the cover of books, a fylleting iron, a great corner flower, a little corner flower, a rose for the backe of a booke' (John Denys, *c.* 1578); the meaning of 'printes' suggests the use of panels (Gray and Palmer [1915] pp. 27, 56).

The two-sided bronze blocks ('*Stöcke*') referred to above had been used for central decoration, usually set inside a frame made by a couple of border rolls, as is characteristic

for the covers of many German bindings from the late fifteenth century onwards; the iconography was often complementary, like the portraits of Luther and Melanchton, the portrait of a count and his coat of arms, etc. An extant example of a two-sided block, dating from *c.* 1600 once belonging to the Carthusians in Erfurt, was described and illustrated by Rhein (1960 fig. 3); it is an oval block about 17 mm thick, one side depicting Christ's resurrection, the other the portrait of St Bruno; a similar two-sided block with the portrait of Duke Henry Julius I of Braunschweig and his coat of arms, dated 1605, was described by Kyriss (1961). A sixteenth-century panel stamp of copper is preserved in the Ashmolean Museum in Oxford (Middleton 1963 p. 169).

A quite different category is formed by the iconographically much richer and larger panels, popular in the late fifteenth and the first half of the sixteenth centuries in Flanders, in Rhineland and Westphalia and also in France and England. The meticulous study of Fogelmark (1990) of Flemish panel-stamped bindings rectified a number of past misconceptions. They might have been a time-saving device, enabling the binder to decorate one or both covers in a single step, and at the same time a cheaper device, since they were multiple sets of cast dies, and not, as had been assumed previously, unique engraved panels. Fogelmark reached these conclusions after careful observation of the nature of the nail-marks, finding evidence that the panels had been mounted on (wooden) blocks and that two such blocks could be pressed simultaneously on both covers; however, there are instances where the same panel has been impressed several times on one cover (which meant more labour and less precise alignment). It is obvious from the high three-dimensional relief of the typical Flemish panels that they had not been engraved but produced by clichage from moulds, in contrast to the flat relief of most contemporary hand tools, as well as the engraved metal blocks described above. But casting was not necessarily restricted to high-relief sculpted work on the Flemish panels; some ornamental rolls clearly show a three-dimensional relief, undoubtedly produced by clichage. Even the previously mentioned flat-relief floral diaper panel with the pomegranate (Figure 9.44[c]), usually engraved, was apparently also produced by casting as convincingly shown by Fogelmark (1990 pp. 83–4, pl. xxxvi) for an example used on three volumes of an incunable from 1496. Some consequences of these newly gained insights are disconcerting: in the past, attributions of hand tools and panels to certain binders and binderies have been made on the assumption that they were unique; if they turn out to be produced by multiple cast copies – slight changes in dimensions or details easily occurring on repeated clichage – then the fruit of much labour would melt away in thin air.

Although Fogelmark's important contribution has greatly advanced our knowledge of some essential technical aspects of blind tooling in general, there are still many unanswered questions. Very few actual tools and panels have survived to enable us to assess their materials and the method of manufacture; for possible extant Flemish panels see Fogelmark (1990 pp. 190–1 and Oldham 1958 p. 1). There is uncertainty about the dimensions of the tools that could still be stamped by hand or that needed a press and we are largely ignorant of how actual hand tooling and blocking with a press were done. Archival and literary evidence is scanty: the inventory of Godevaert De Bloc of 1383 (Verheyden 1936–7) specifies a '*torcular imp(re)sar(um) vulgariter dictum printen*', indicating that panel blocking was prac-

tised for about one hundred years before it truly flowered. This would authenticate the earliest isolated fourteenth-century occurrences (Adam 1923b; Rhein 1936), but not yet the purported thirteenth-century panel on a binding of Wouter van Duffel of Antwerp (Verheyden 1937).[49] An old iron press (*'Eine alte eisserne presse mit dem schlüssel'*) is mentioned in an 1592 inventory (Kirchhoff 1889). Zeidler (1708 p. 127) gives a brief description of tooling in blind and in gold and illustrates tools as well as an iron press, on which he instructs his reader to press only the cover and not the whole book. A wooden press for printing the central block is illustrated in Dudin (1772 pl. XI), together with binders' tools and blocks, the latter having a lining of several layers of cardboard (for an even distribution of the pressure?); Dudin's representation of the book in the press would suggest that both covers were impressed simultaneously.

There remain still certain ambiguities over the temperature of the tool required for obtaining a permanent blind impression. The French term *'estamper à froid'* suggests that blind tooling without heat is feasible as evidenced by the following examples. Blind tooling on Ethiopian and Islamic bindings (see sections 4.3 and 5.5) was probably carried out with cold tools, hammered into the dampened leather; this is supported by extant tools with a blunt tang carrying marks of hammering, as well as panels made of incised (camel) hide, which certainly could not have been heated (Haldane 1983, pp. 7–19, figs 2, 5, 15, 16, 21).[50] Wooden panels which could hardly have resisted any heating seem to have been used for blind stamping; possible evidence is presented by bindings described by Theele (1933), Geldner (1958 pl. XXI; 1969) and Juntke (1967), all from Germany in the second half of the fifteenth century, and the Flemish ledger bindings with limp covers embossed with purportedly wooden panels (Oldham 1958 p. 1; Indestege 1961; but see Fogelmark 1990 pp. 124 and 193). Likewise, wooden panels were employed for embossed leather tapestry ('Spanish leather'), the technical process being well documented and several wooden panels are still extant (Gall 1965, pp. 295–316, fig. 231; Waterer 1971 pp. 28–42, fig. 42). Having myself decorated modern bindings using lino-cuts, plastic plates and wooden blocks (Szirmai 1984 nos. 10, 18, 28, 45) I have no doubt that blind tooling without heat could have been a common practice in the past (see also Chapter 5, note 11).

On the other hand, there is plenty of evidence for the use of heated tools. Faust (1612 pp. 84–5) advises the rolls to be moderately heated, so that one can touch them, while Zeidler (1708 p. 128) demands them to be hot: *'vorher beym Feuer heis gemacht damit der Kleister auch das weiche Leder* [. . .] *darunter zugleich erhärte'*. Prediger (1741 vol. 1, p. 159) would have it both ways: the tools should be lukewarm (*'als du solche auf der Hand leiden kanst'*), although some binders do apply them cold (not approved by Prediger, since the result is less permanent); but the block for printing with the press (p. 163) should be hot *'dass er fast zischet'* (almost hissing).[51] Sometimes they were too hot indeed: scorching can occasionally be observed, both in the use of hand tools and panels (Fogelmark 1990 pp. 24 and 197; pl. IV). Clearly both methods were practised; perhaps heating was preferred for faster results.

Many more aspects of blind tooling need further study, such as the problem of how the binder positioned and aligned the panels under the press. Goldschmidt's suggestion (1928 p. 55, pl. xxxiii and lxxxii) that the panels were fastened to the book by ropes has

rightly been questioned by Fogelmark (1990 pp. 6–7), but the interpretation of the rope impressions, illustrated by Goldschmidt, as part of the 'tying up' of the raised bands (see section 9.9) is even more questionable to me. Impressions of auxiliary guide-lines are often found both on hand-tooled and panel-stamped bindings, obviously a visual aid for the binder to lay out the pattern and position the tools.

In the majority of Flemish panel bindings studied by Fogelmark the core of the covers is of board, a relatively soft material which will be in part deformed under the pressure of the panel stamp and thus contribute to the high three-dimensional relief (Fogelmark 1990 p. 9). Wooden boards would offer more resistance, which may explain a possible attempt to provide a higher quality impression by sandwiching a thick piece of paper, somewhat larger than the panel, between the board and the leather covering (Leiden UB LTK 1985; see note 14).

* * *

Although the decoration in gold on bookbindings has been the subject of extensive studies in the past, its origin and early techniques abound in uncertainties. There is little doubt that gilding reached us from the Mediterranean realm: Venice, having traded with the East for centuries and host to many craftsmen from those regions seeking refuge in Italy, has been suggested as the port of entry. On the other hand, close relations between the Spanish court and Naples could explain the arrival of superb decorative techniques of Hispano-Arabic origin in Italy. Gottlieb (1910) was the first to substantiate this with archival data from the 1480s on the binder Scariglia, working in Naples but of Spanish origin, already mentioned in connection with early edge gilding. Goldschmidt (1928 pp. 83ff.) devoted a whole chapter to the origin of gold tooling in the West. He supported Gottlieb's idea that in Europe the court of Naples was the cradle of gold tooling, but without adding any essentially new data. De Marinis (1960 vol. 1 p. 4) gives details of the 1481 Naples archival evidence and provides a wealth of data on Italian gold-tooled bindings and their description in contemporary inventories.[52]

Fifty years after Goldschmidt's somewhat apodictic contribution we seem to have progressed but little. The very first sentence of A. Hobson's erudite study (1989) testifies to his particular interest 'in the origins of gold-tooling in the west', asserting at the same time that 'Goldschmidt's views on this subject were seriously at fault'. He suggests that gold tooling had been known in Northern Italy (Padua, Florence, Bologna) since the first half of the fifteenth century, but his evidence is often *ex silentio*, and marred by the condition of the often ruthlessly restored bindings. A. Hobson's observations (1989 p. 30) that 'the early [Italian] gilt bindings are too unlike one another to be descended from a single prototype' and his conclusions that these 'must be the result of independent experiments in different places' contradicts all basic principles of the evolution of any craft. Furthermore, there are no solid facts to suggest that 'the direction of flow of knowledge about gold-tooling [. . .] seems to have been the reverse of what Goldschmidt (1928) supposed: "Spain learned from Naples, Naples followed Rome or Padua"' (A. Hobson 1989 p. 58). This disregards the evidence presented by Thomas (1939 pp. xxvii ff.), quoting from Spanish royal inventories of 1410 and 1458 and referring to the term '*oripell*' [tinsel or gold leaf] and to books '*cubert*

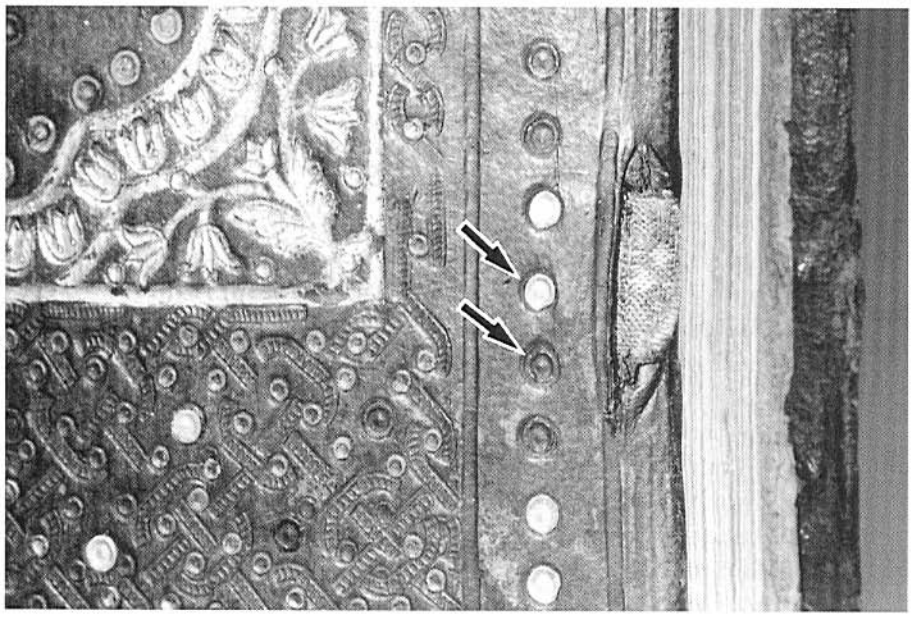


Figure 9.45 Gilt roundels '*alla fiorentina*' on a Corvinian binding in two variants: shining bright gold or gold with a blue tint (arrows); note also remnants of the ribbon strap (ÖNB Cod. 218/1037, parchment manuscript dating from *c.* 1480).

doripell emprentada' or '*con estampaciones de oro*' [with gold stamping]. These data, as well as the fact that gold tooling had been known to the Moorish binder Bakr al-Ishbili in Seville as early as the late twelfth century (Gacek 1990–1; see section 5.5), leave little doubt about the Hispanic origin of gold tooling in Europe.

The same origin might apply also to another variant of gold decoration, namely the punch-gilt roundels '*alla fiorentina*', characteristic of many bindings from Florence, Venice, Naples and also from Spain and from the Corvinian workshop of Buda (Figure 9.45). No study has been made of the material and structure of these roundels, yet there are plenty of surmises: '*mit flüssigem Golde bemalten Lederplättchen*' (Gottlieb 1910 col. 3), '*Darmhäutchenlamellen*' (Adam 1915), 'little round bits of plaster or gesso let into the leather, grounded with some reddish varnish and then painted gold' (Goldschmidt 1928 p. 88) or 'punches of yellow, red and green, probably on roundels of vellum or stucco' (Miner 1957 pp. 86ff.). Or could it be that the term '*puntezade de stagnuolo*' (De Marinis 1960 vol. 2, p. 42) points to varnished and coloured tin, often used as a gold substitute in medieval times?[53] And how do these '*piccoli dischi dorate*' – the Spanish '*botoncitos de oro*' (Thomas 1939 p. xxix) – relate to the 'gold dots' on Islamic bindings (see section 5.5)?

Another way of applying gold, namely painting in blind impressions with liquid gold ('brush gilding') was frequently used on Italian and French bindings of the second half of the fifteenth century, often combined with stamping with gold foil. Gottlieb (1913) described and illustrated this mixed technique on Venetian bindings decorated in Persian or Turkish style, among others on the four lavish filigree (cut-out leather) Ugelheimer bind-

ings, bound between 1477 and 1481 (Gotha LB). Confusion arose after Adam (1915) challenged the issue by observing on the Ugelheimer bindings lines tooled with gouges;[54] however, on re-examination he discovered that in fact an incompetent restorer – '*der Herr mag es ihm verzeihen*' – had masked original brush gilding by ruthless retooling with gouges (Adam 1916a). Brush gilding is evident on a similar, unfortunately rather damaged, lavishly decorated binding of a 1517 manuscript by Ludovico Arrighi (Amsterdam UB XV D 7), probably of Venetian origin. Many examples of brush gilding are also evident on Persian and Turkish bindings, among others on the fifteenth-century bindings of the Ottoman court (Raby, Tanindi and Stanley 1993).

There seems to be neither documentary evidence of brush gilding in the West, nor mention of it in the early binding manuals. Yet liquid gold must have already been well known to medieval craftsmen: the twelfth-century treatise of Theophilus (Hawthorne and Smith 1979 pp. 34ff.) describes the milling of gold to prepare gold ink, and later technical treatises abound with recipes for liquid gold paint (see Merrifield 1849; Thompson 1936 pp. 196ff.). Brush gilding can easily be recognized by its dull appearance, the occasional spilling of gold paint and irregularities of the design, since the blind lines were very likely drawn free-hand and not impressed with tools (Figure 9.46).

Medieval treatises distinguish two methods for gilding larger areas with gold leaf, namely the 'wet' and 'dry' methods. With the wet method, a medium such as glair is laid on the surface and gold leaf applied immediately; according to the dry method the medium, which also is usually glair but may consist of oily substances, is allowed to dry off and become barely sticky, before the gold leaf is laid on. Adam (1912a; 1915) suggested that the wet method ('*Nassvergoldung*') was used by Persian and Turkish binders and later by their followers in Italy. Faust (1612 pp. 60–5) was aware of the difference: he describes the dry method with glair for parchment bindings '*als ghy met den kneukel van uwen vingher aantast den gront an gheen plack en gheeft, soo isset recht*' [if you touch the ground with the knuckle of your finger and it does not stick, then it is right]. His instructions for the wet method sound like a translation of Theophilus (1963 p. 31): 'take glair [. . .] and apply gold leaf with the greatest speed'.[55] Regretfully the editor of Faust's manual swept this difference under the carpet, assuming that it only concerned the dilution of the glair (Szirmai 1991b); unfortunately indeed, since wet gilding is probably the very technique used for those puzzling dull gilt corner decorations and central ovals, such as appear on the Venetian sunk-compartment dogal bindings (Needham 1979 no. 75). The wet method might also have been used on the gold-blocked bindings often described as Lyonnese (Needham 1979 no. 61) and on early gilt panels, like the surmised first English example of 1519 (Bodley Bodl. 523), which it is suggested was impressed with wooden panels without heat (Nixon 1952; Oldham 1958 p. 39).[56]

Gilding with heated tools and with glair as the adhesive medium gradually became the standard method of the Western binder. Whereas blind tooling was preferably done with tools cut intaglio or shaped in three-dimensional relief as for the Flemish panels, for gilding the tool was cut in flat relief, although in the early days of gilding either type of tool was employed.[57] This was true for the tools with single ornaments ('*petit fers*'), the ornamental rolls, fillets (replacing the creaser used for blind lines) and gouges for curved line

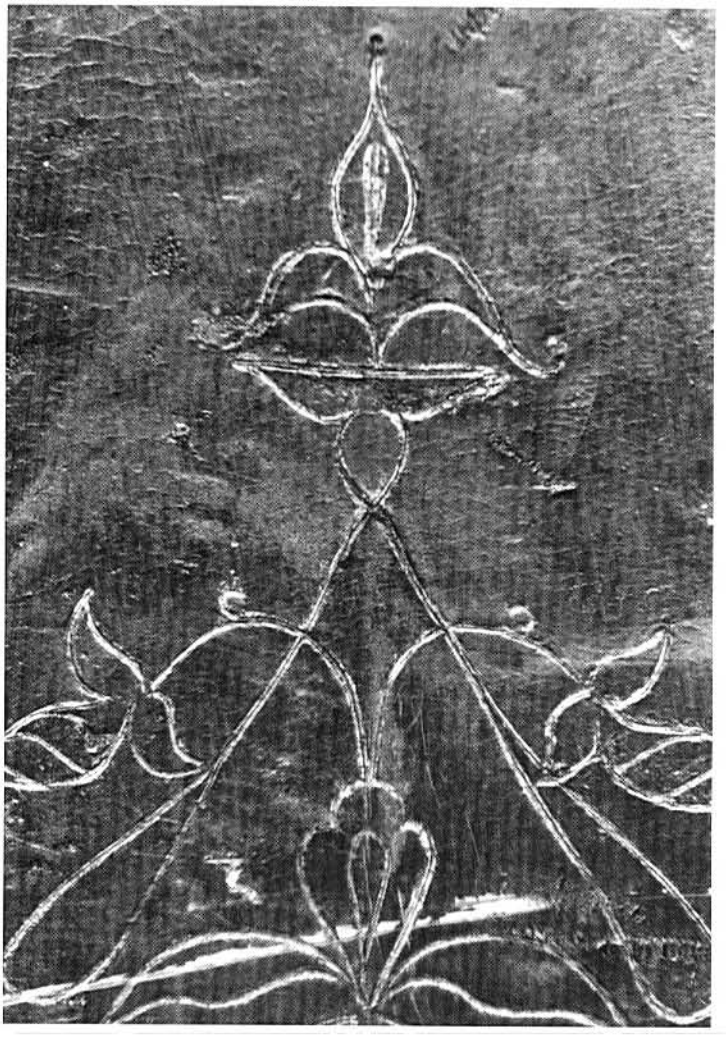


Figure 9.46 Decoration with brush gilding. With a blunt tool the design has been drawn free-hand into the surface of the leather and the grooves filled in with liquid gold (Berlin Deutsche Staatsbibliothek Inc. 2° 3997, Venice imprint of 1487; see also Husung 1925 pl. 37 and De Marinis 1960 vol. 2, pl. 288).

ornaments, tools from which the binder could compose the most intricate patterns. Gold tooling was a lengthy process and naturally, as already witnessed with blind tooling, attempts were made to save labour by using panels. The earliest examples are those of Geoffroy Tory of Paris from the 1530s, followed in the mid-sixteenth century by the Lyonnese panels and a whole series of panel-stamped bindings from Augsburg; yet their success as expedient publisher's bindings remained limited.[58]

Finally, a few words should be said about the kind of gold used for bookbinding. Whereas relatively pure gold will retain its lustre for centuries, gold alloys with silver, copper, tin or zinc are susceptible to discoloration and tarnishing. Silver and gold alloys with high silver contents quickly tarnished black, which in the past often led to confusion

with black paint (for example, De Marinis 1964); sometimes tiny particles of the original metal had remained and can be identified under a microscope.[59] Yet, a black imprint might also indicate that printer's ink had been used, as conjectured by Adam (1919–20) and Rhein (1934). All this illustrates that we are still ignorant of even some very basic aspects of gold tooling. Whereas a profound technical analysis has been made of the process of printing in gold, which constitutes a rarity in early typography (Carter, Hellinga and Parker 1983), the techniques of gilt decoration of book covers have not yet managed to arouse great interest among scholars in the field of bookbinding.

9.11 FASTENINGS

Usually gothic wooden-board bindings were furnished with fastenings, mentioned in early documentary sources as *clausurae* and *fibulae* (Wattenbach 1871 p. 228), *firmalia* (Vezin 1989), *affibulatorium*, *fermentum*, *firmatorium*, *fermaux*, *rampini*, *tancador* and *crochetum* (Laffitte 1989). Sometimes details are given, such as '*cum quatuor serraturis argenteis*', and '*cum azuli quatro de otone*', quoted from fifteenth-century inventories by De Marinis (1960 vol. 1, pp. 29–30, vol. 2, pp. 41ff.). The notebook of de Bray (1658 p. 33) briefly describes the mounting of '*sloten*' [clasps], for which recesses in the boards had to be made before covering. Zeidler (1708 p. 132) gives details of the '*Schlösser*' and notes that '*die Alten haben ihre Schlösser gantz von Eisen geschmiedet; theils von Messing dicke gegossen* [. . .] *Heute zu tage* [. . .] *werden die Clausuren gemeinlich nur von Milanischen Blech von den Gürtlern aufs liederlichste gemacht*'.[60]

The literature on fastenings of gothic bindings is meagre, but not as meagre as is often suggested: first attempts to classify German fastenings were made by Adam (1923a; 1927) and Lüers (1936); Nuska (1965) provided a typology of fastenings on gothic bindings from Bohemia. Archaeological finds in Hungary of gothic fastenings were published by Irás-Melis (1974; 1980; 1985). Jäckel (1985) briefly reviewed the main German variants (but with partly erroneous dating); a survey of material from Saxony was undertaken by Müller (1991). Some data on fastenings from Southern France were given by Carvin (1988). Systematic studies are more recent, such as a survey of the fastenings on the bindings in Zutphen Librije (Szirmai 1991c) and on bindings in the British Library (Dürrfeld 1992; 1993; 1996); a typology of the furnishings on bindings in Hungarian libraries has been presented by Horváth and Tóth (1993).

The fastenings on gothic bindings belong to two categories. One, the long-strap fastening which had been widely employed on romanesque bindings (for details see section 8.11, Figures 8.22 and 8.23) and remained in use until the late fifteenth century. The other, namely the hook-clasp fastening, makes its appearance around 1400 and gradually becomes the dominant type. It consists of a catch plate attached to the board edge and a movable clasp in the shape of a hook, riveted to a strap anchored to the edge of the opposite board. The mechanism in cross-section and the main elements, as well as their variants are sketched in Figure 9.47. As a rule, recesses were cut into the boards to accommodate the catch plate and strap. Usually the fastenings were fitted after covering, but occasionally

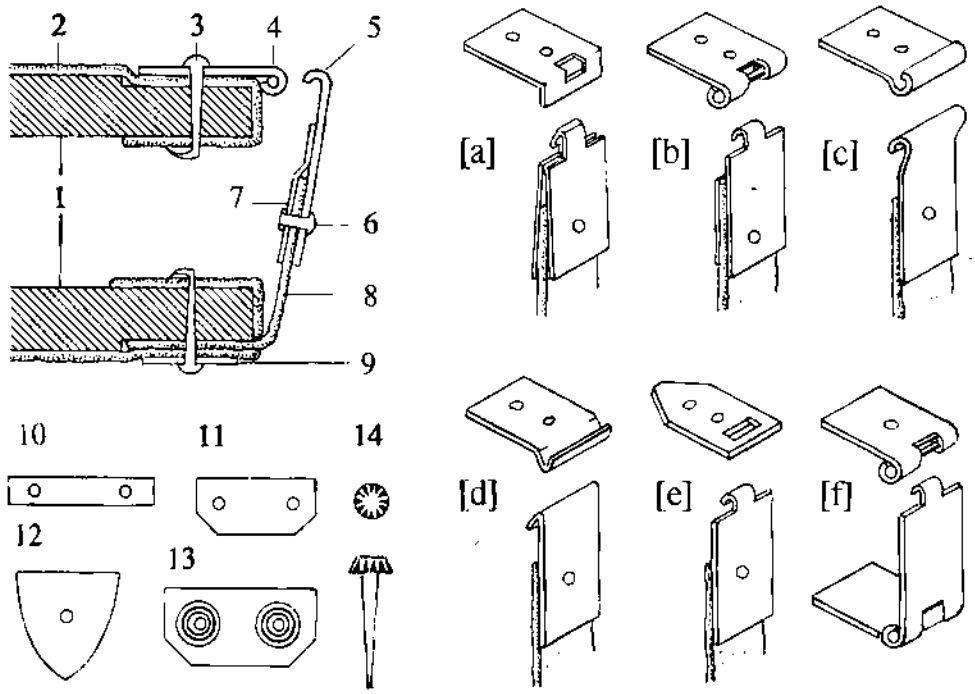


Figure 9.47 The components of hook-clasp fastenings and the main variants of their catch mechanisms. At the left: 1, boards; 2, covering; 3, nail; 4, catch plate; 5, hook of the clasp; 6, rivet; 7, back plate; 8, strap; 9, anchor plate; 10 to 13, various anchor plates; 14, ornamental nail. The catch mechanisms are: [a], bent slot; [b], pin; [c], roll; [d], shovel; [e], flat slot. All-metal fastenings [f] comprise a hinge based on catch mechanism [b]. The hook can be narrow, to fit the slot or pin catch [a, b, e, f] or have the full width of the clasp or catch plate [c, d].

both catch plate and strap attachment are hidden under the covering and thus must have been anchored before; this procedure is often the case with types [c], [d] and [e]. The catch plate is fixed to the board with two or more nails or rivets; the clasp may be folded from one piece of metal sheet, [a], or it may be worked with a soldered or riveted back plate, [b]; in either case the strap is riveted in between (Figure 9.47 [6]). The strap usually consists of one or several layers of leather, often reinforced with a strip of parchment. The straps can be decorated with blind lines, but frequently scraps of leather of old coverings were employed, which undoubtedly hastened their breakage. The strap ends are fixed to the board edge with nails or rivets, with or without a metal anchor plate (Figure 9.47 [10 to 14]). Ribbon was also used for straps, notably on Italian and French bindings as well as on the bindings for Corvinus. In the all-metal hook-clasp fastening [f], a variant with a catch plate of type [b], the clasp is hinged directly to the anchor plate. The following discussion of the main types of gothic fastenings is partly based on my own findings on bindings of Groups A, B and C, and partly on data from the literature; the quantitative summary in Table 9.16 is meant to give a general impression of the occurrence of various types and the direction of closing.

Table 9.16 Fastenings on gothic wooden-board bindings

	Long-strap fastening				Hook-clasp fastening								None	Total gen.	Closing on lower cover	Closing on upper cover
	Sh*	Ca	Tr.L	Total	a	b	c	d	e	f	Tr.H	Total				
A: General England	–	–	8	8	–	1	–	–	12	–	1	14	–	22	21	1
Netherlands**	–	–	–	–	–	16	–	–	–	3	–	19	–	19	2	17
North Germany	2	1	–	3	8	5	2	–	–	–	2	17	–	20	–	20
South Germany	2	2	2	6	12	7		1	–	–	3	23	1	30	2	28
Lake Constance	4	2	15	21	5	2	2	11	–	–	8	28	3	52	13	39
Austria	–	1	–	1	3	–	–	–	–	–	–	3	–	4	–	4
Hungary	–	–	–	–	–	–	8	–	–	–	–	8	–	8	8	–
Italy	–	–	–	–	–	1	1	–	–	–	3	5	–	5	5	–
Total	8	6	25	39	28	32	13	12	12	3	17	117	4	160	51	109
Percentage	5.0	3.8	15.6	24.4	17.5	20.0	8.1	7.5	7.5	1.9	10.6	73.1	2.5	100.0		
B: Zutphen Librije	–	–	–	–	–	101	–	–	–	–	9	110	–	110	?	101
C: St Gall rebindings	59	–	55	114	1	–	–	9	–	–	1	11	5	125	1	124
Schmidt-Künse.(Germany)	1	28	67	96	132	21	2	22	–	–	101	278	6	380	10	370
Percentage	0.3	7.4	17.6	25.3	34.7	5.5	0.5	5.8	–	–	26.6	73.2	1.6	100.0		
Dürrfeld (1992) England					1	26	–	–		5	1	33		33	31	2
Germany					48	56	–	–	–	8	2	114		114	–	114
Italy					3	2	18	–	–	–		23	5	28	24	4

* Column headings: Sh, long-strap fastening of metal sheet; Ca, cast long-strap fastening; Tr.L, traces long-strap fastening. Hook-clasp fastenings: a, catch plate with bent slot; b, with pin; c, with roll; d, with shovel; e, with flat slot; f, all-metal fastening; Tr.H, traces hook-clasp fastening.

** includes Rhineland and Westphalia. Added data are derived from the photographs in Schmidt-Künsemüller's (1980) corpus of *cuir-ciselé* bindings and those of Dürrfeld (1992), limited to the fifteenth and sixteenth centuries; the latter study did not include any long-strap fastenings.

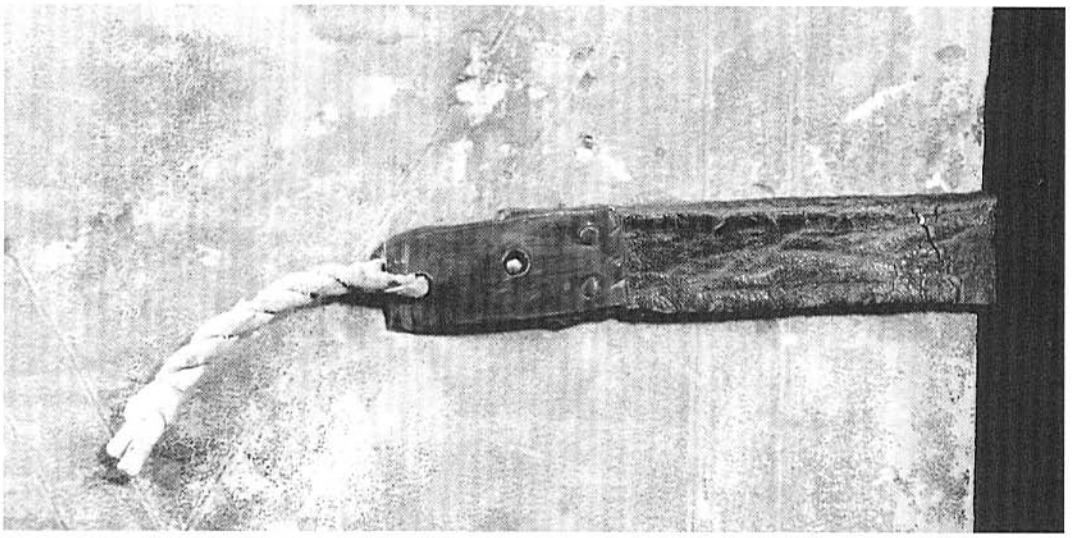


Figure 9.48 Long-strap fastening on a St Gall manuscript (SG Cod. 183, s. ix^{in}) rebound between 1436 and 1461, covered with white reversed sheep. The strap is of brown buckskin, the hasp of brass sheet fits over a simple brass peg, the twisted pull is of white chamois leather.

The data of Table 9.16 confirm that long-strap fastenings were still significantly present on gothic bindings. In Group A as well as in Schmidt-Künsemüller's corpus their occurrence is about 25 per cent; in the St Gall rebindings, dating from 1436 to 1461, they dominate with 88 per cent (Figure 9.48). The latest long-strap fastening I encountered was on a paper manuscript of 1484 (SG Cod. 991).

More than 70 per cent of the bindings listed in Table 9.16 have hook-clasp fastenings, the earliest of which I noted on the binding of a paper manuscript of 1398 (SG Cod. 996). In Group A all types of catch plate seem to occur at random, with the bent-slot variant [a] in Figure 9.47 apparently preferred in the Germanic area. Within narrower geographic boundaries there seems to be less variability: just as St Gall nearly exclusively applied the long-strap fastening, the Zutphen Library (Group B) furnished virtually all their bindings with hook-clasp fastenings with catch plate [b], which was the most common type in the Netherlands. Finally, Table 9.16 shows that the direction of closing confirms, at large, the generally observed prevalence of fastenings closing on the lower cover in Italy and England, whereas fastenings on German and Dutch bindings are preferably closed the other way (Oldham 1952 p. 8). The Lake Constance area seems to be an exception, showing a less clear-cut preference. The use of either closing direction has been reported elsewhere: all monastic workshops in Nuremberg followed the 'German rule', except the Augustinians who preferred clasps closing on the lower cover (Kyriss 1940 p. 54).

The more detailed analysis of hook-clasp fastenings in different regions and periods has revealed some distinct characteristics which justify their separate treatment. In the Netherlands, the earliest examples dating from the fifteenth century (Figure 9.49), exhibit pleasing shapes often with zoomorphic elements like a duck's head in [a] and [c]; generally

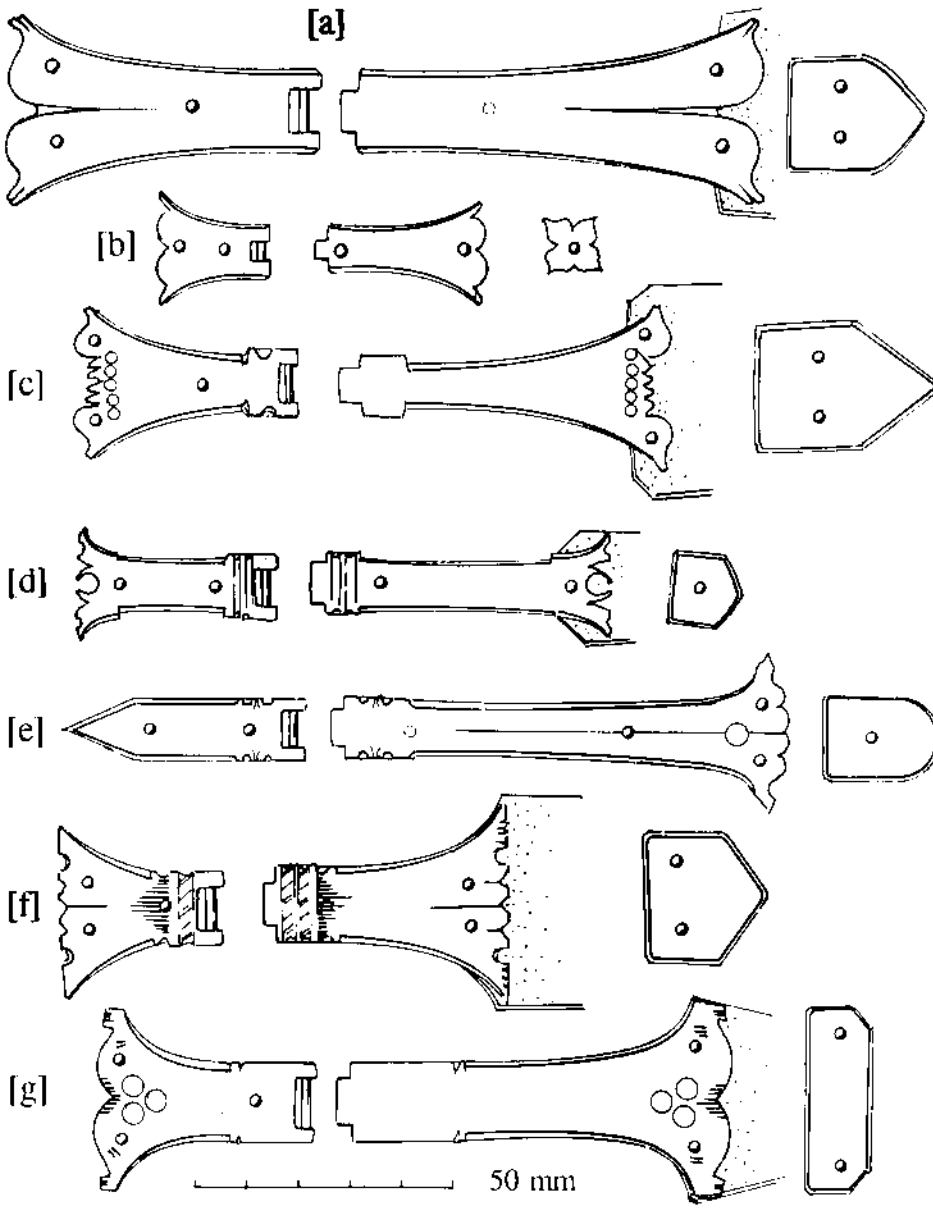


Figure 9.49 Hook-clasp fastenings on fifteenth-century bindings from the Netherlands: each example represents at least three identical specimens. The examples are of: [a], Libr. M 75/4 (1481); [b], Utrecht MCC BMB 164 (*c.* 1480); [c], Libr. M 75/2 (1481); [d], Deventer AB 101 D 18 (1487); [e], Utrecht MCC BMH B 1 I (*c.* 1498); [f], Libr. M 88 (1493) and [g], Libr. M 54 (1491).

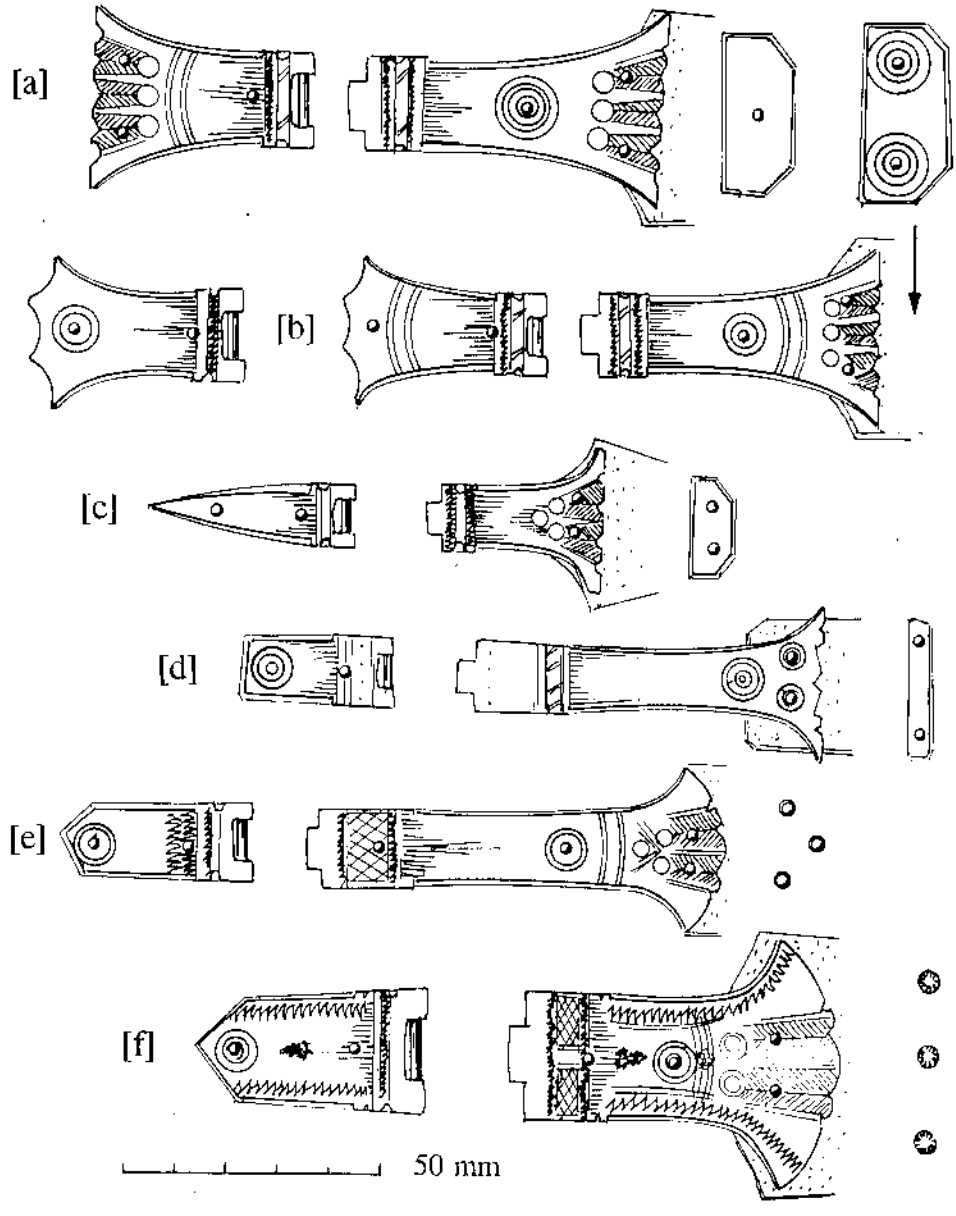


Figure 9.50 Hook-clasp fastenings on sixteenth-century bindings from the Netherlands, representing three to ten identical specimens. The actual examples are: [a], Libr. M 142 (1543); [b], Libr. M 117/2 and M 117/4 (1530–1547); [c], Amsterdam UB 231 E 4 (1521); [d], Libr. M 364 (1567); [e], Libr. M 743 (1536) and [f], Libr. M 262 (1568).

speaking, the catch plate and clasp are made according to the same design, the lancet-shaped catch plate [e] being an exception. They are made of sheet brass, 1 to 2 mm thick, with bevelled edges, simply engraved lines and ornamental holes ([f] and [g]).

Figure 9.50 shows fastenings from the sixteenth century from the Netherlands, based on the study of the bindings in the Zutphen Librije (Szirmai 1991c); while types [a] and [b] are most frequent and originate from the 1560s and 1570s, when the nucleus of the Zutphen Librije was established, type [f] dates from the end of the sixteenth century and is found on later acquisitions. The Eastern Netherlands, where Zutphen is located, were at that time in close contact with the Rhineland and Westphalia, which might explain the occurrence of typically German fastenings, like those in Figure 9.52 [a], [g] and [h], on some of the Librije bindings.

In contrast to the barely decorated fastenings of the fifteenth century, those of the sixteenth century (see Figure 9.50) are usually and in many different ways and combinations individually embellished with engraved lines, stamped ornaments, concentric circles, a particular pattern made by wriggling or walking with a flat graver and holes underlaid with coloured parchment or paper. Usually the clasp has a slightly convex shape, likely to provide a greater stability; this shape was achieved by hammering, as is often evident from the marks of the raising hammer, found longitudinally along the shaft and at the tail of the inner face. The edges of both the catch plate and the clasp were bevelled with a file; the back plate was usually riveted, the head of the rivet on the outer face being filed away. Figure 9.51 illustrates details of decoration as well as the strap attachment of a characteristic Dutch hook-clasp fastening from the second half of the sixteenth century.

A detailed study of the shape and the decoration of the original fastenings of *c.* 250 bindings of the Zutphen Librije (Szirmai 1991c) has yielded their precise typological classification, forming the basis of the reconstruction of the lost elements in the restoration of the bindings; archival data compiled by van Dongen (1984) has even allowed the ascribing of certain types of fastenings to individual workshops. Fastenings shown in Figure 9.50[a] prevailed on bindings dating from between 1490 and 1550, those of type [b] between *c.* 1530 and 1580; all the clasps on the bindings from the workshops of the Brethren of the Common Life in Deventer and Doesburg, active between the 1560s and 1570s, are of the latter type. Apparently not all binders in the same area had the same supplier of fastenings: two of a series of four volumes of Jason de Mayno's *Commentaries* (Lyon 1536) in the Zutphen Librije, were rebound in 1572 by the Brethren in Doesburg and furnished with fastenings as illustrated in Figure 9.50[b], while the other two were bound in 1576 by Simon Steenbergen of Deventer, who employed on these, as well as on his other bindings, type [c] of Figure 9.50 (van Dongen 1984 nos. 36, 37, 55 and 56).

Hook-clasp fastenings from fifteenth- and sixteenth-century Germany show several features similar to those observed in the Netherlands and described above. Those on incunables (Figure 9.52[a] to [c]) have matching tails and are rarely decorated. The peculiar shape of type [c] suggests that splitting of the tail was based on a mechanical phenomenon: when working metals by hammering, internal stresses arise which can lead to cracking, unless the metal is frequently annealed. Probably such cracks, resulting from hammering the clasps cold, were smartly disguised by filing and shaping them into a pleasing design.

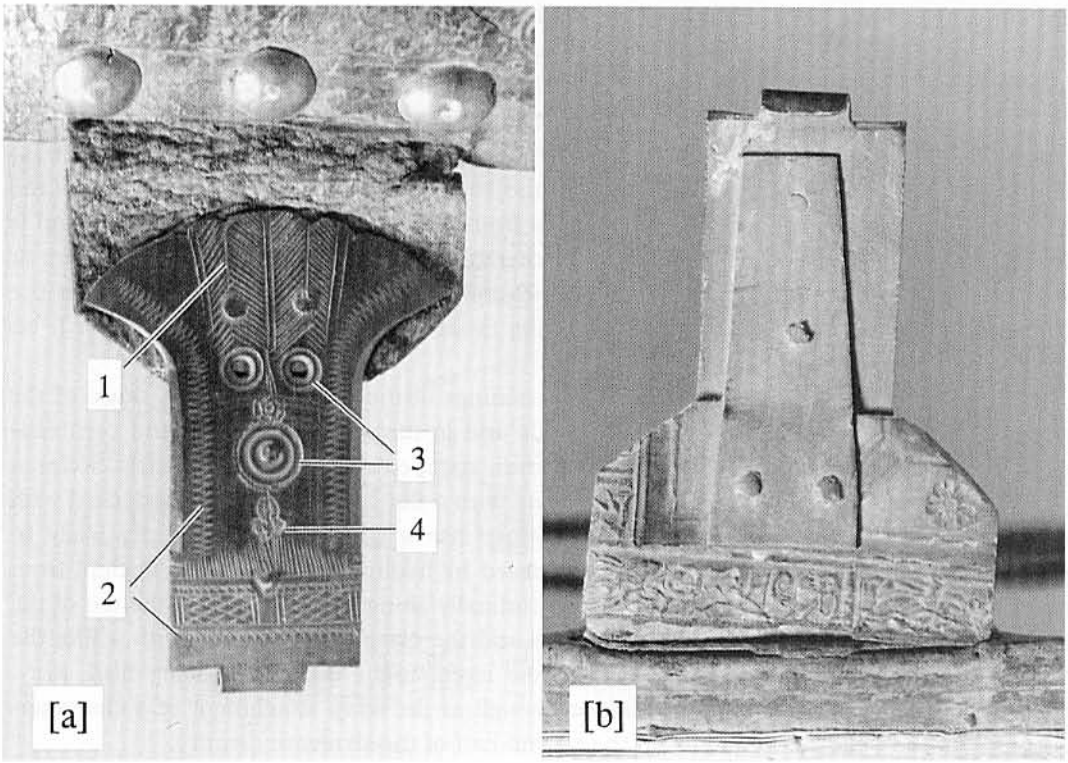


Figure 9.51 Details of the clasp of the hook-clasp fastening sketched in Figure 9.50 [f]. Various elements of decoration are illustrated in [a]: (1), engraving; (2), 'walking'; (3), turning of circles; (4), embossing with ornament punch. In [b], the back of the clasp is shown with the riveted back plate; note also the strap of reused blind-tooled leather covering (Libr. M 262, Cologne imprint from 1568).

The German sixteenth-century hook-clasp fastening is decorated with similar elements that have been described on contemporary Dutch examples; however, the shapes of the catch plate and the clasp match up less often (Figure 9.52[h] and [i]). A feature seemingly characteristic of Northern Germany was the engraving of the name of the owner of the book on the shank of the clasp, an 'ex libris' (Altmann 1972).[61] The soundness and comeliness of these objects represent such a high standard of workmanship that one is tempted to assume that such fastenings were made as single-piece work by specialized craftsmen. Such craftsmen, the *Gürtler*, *Klausurmacher* and the *faiseurs de fermoirs*, were probably the suppliers of metal fastenings and furnishings to the binders, certainly not only in Germany, although there is evidence all over Europe of trade in such products from Germany.

However, there is little doubt that the binder himself occasionally produced fastenings, as appears probable from inventories naming tools for metal working (see note 60). Direct evidence are those simple examples made from plain metal sheets, but also decorated ones from *Ornamentblech*, brass sheets or bands embossed with floral designs, or words such as *IHS*, *Ave Maria* and the like (see Figure 9.52[d] and [e]) From these continually embossed half-products the binder could cut clasp, catch plates and anchor plates;

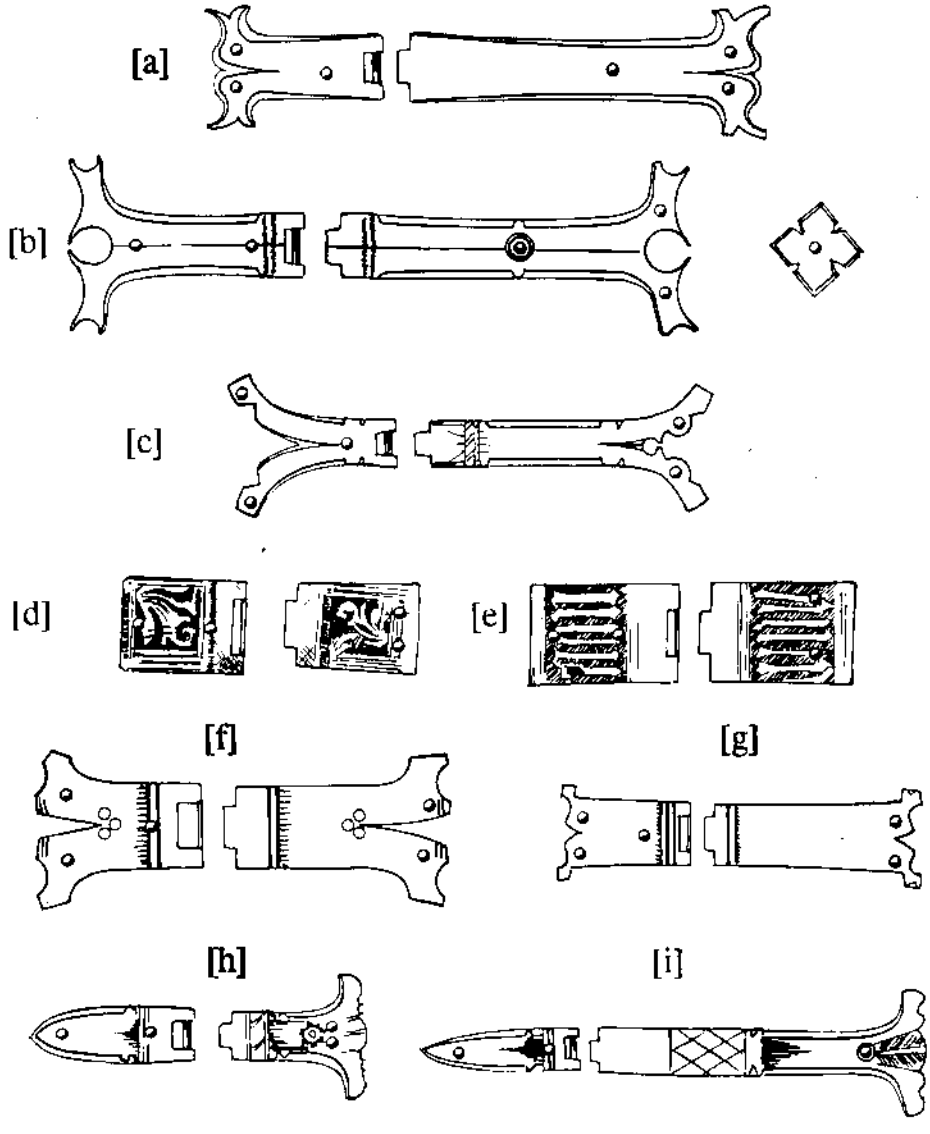


Figure 9.52 Hook-clasp fastenings on German fifteenth- and sixteenth-century bindings in the British Library (after Dürrfeld 1992). The examples are found on: [a], BL IB 7930 (1491); [b], BL IB 4043 (1480); [c], BL IB 1975 (1495); [d], BL c.129.k.2 (1513); [e], BL IB 2267–68 (1490); [f], BL c.52.h.6 (1506); [g], BL c.64.h.3 (1518); [h], BL c.47.g.11 (1537); [i], BL c.64.c.19 (1568).

however, it is equally possible that fastenings of this kind were sold ready-made. They are usually square in shape, with catch plate and clasp often of the same pattern. Such hook-clasp fastenings were common in Germany and Austria; Dürrfeld (1992) found them to prevail in the period between 1470 and 1513, which agrees with my findings (though the earliest isolated case I noted dates from 1432 (SG Cod. 448, possibly from Hersfeld, Germany). They also occur on bindings from Bohemia (Hamanová 1959 nos. 24, 30 and 32; Nuska 1965 pl. XXXI), Poland (Zwinogrodska, Hordinski and Storm van Leeuwen 1990 nos. 18, 27 and 40; Ogonowska 1993 figs 5–12) and from Hungary; instances from the latter country comprise extant bindings as well as archaeological finds excavated at the Castle of Buda, probably from the Corvinian workshop (Irás-Melis 1974; 1980; 1985). According to Carvin (1988 p. 113) similar hook-clasp fastenings of *Ornamentblech* were also employed on French bindings. This wide distribution suggests that they may have been products of German manufacture exported all over Europe.[62]

Data on fastenings of English gothic bindings are too scanty to allow even a preliminary typological outline. Systematic radical removal of fastenings, as well as their loss through restoration of the binding, markedly reduced their number: in the material from the British Library Dürrfeld (1992) found only six catch plates from the fifteenth and 27 from the sixteenth century. She observed the relatively predominant type with a lancet-shaped catch plate in 19 cases, but only one of these has retained its clasp (Figure 9.53[a]). Another type I came across has a flat catch plate inserted under the covering, unfortunately only one of the 12 instances having preserved both catch plate and clasp, [b]. Type [b] can be seen in several works on the decoration of late-medieval English bindings (for example, Hobson 1929 pl. VIII, IX and XIII; Oldham 1952 pl. XII and XVI; Oldham 1958 pl. V; Clarkson 1996a illustrates them as they appear in radiographs).

Hook-clasp fastenings on bindings from Italy, Spain and Southern France are unlike those found north of the Alps: the shapes are markedly different, the roll catch plate predominates, the slotted type is infrequent or even unknown. Systematic studies are lacking; the sketches in Figure 9.54 are based on reproductions in De Marinis (1960), [a] to [c], supplemented with documentation by Dürrfeld (1992) for Italy, [d] to [f], by Carvin (1988) for Southern France, [g] and [h], and by those of Horváth and Tóth (1993) for the Corvinian bindings, [i] and [k]. The clasps have often been lost; Dürrfeld (1992) encountered, out of a total of 28 Italian examples from the fifteenth and sixteenth centuries, only seven complete fastenings. Carvin (1988 p. 113) found only two complete sets among 48 hook-clasp fastenings; 20 belong to types [g] and [h], the remainder to types [a], [b] and [i]. Type [a] may be seen on Spanish bindings (Thomas 1939). Two types of catch plates occur on the Corvinian bindings (Horváth and Tóth 1993 pp. 63–70), namely the trefoiled roll catch plate [i], without any corresponding clasp, and the inserted-roll type [k], obviously attached before covering and found complete in a single instance.[63] Generally, Italian and Spanish bindings, as well as those made for Corvinus, have also fastenings at the head and tail; their straps are usually made of a textile ribbon.

Before concluding the subject of fastenings a few particular details should be mentioned. The overwhelming majority of gothic hook-clasp fastenings have straps, which allow the use of standard elements independent of the thickness of the volume. The all-metal type

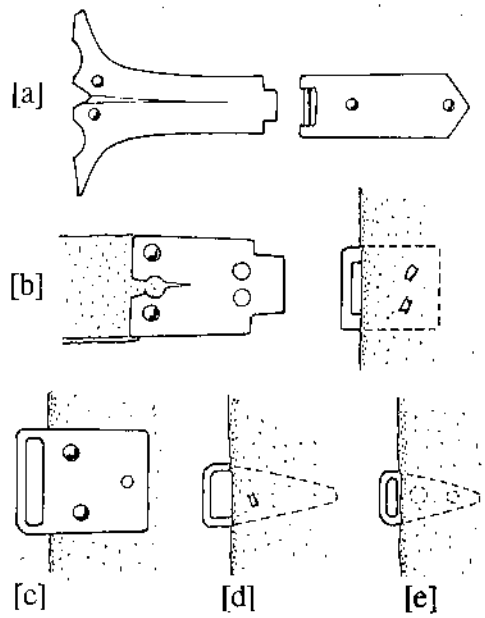


Figure 9.53 Hook-clasp fastenings on English bindings from the fifteenth and sixteenth centuries in the British Library. The main type [a] was observed in 19 out of 33 fastenings by Dürrfeld (1992), but only one has preserved its clasp (BL IA 47755, from 1491). I have found 12 instances (out of 22) of type [b], only one complete (Cambridge UL Add. 6865, s. xiii^{ex}, rebound?); [c], [d] and [e] are catch plates on Bodley Bodl. 250 (s. xiv^{in}), Shrewsbury School Library MS 5 (s. xv^{ex}) and Cambridge UL Pembroke 89 (s. xv) respectively.

(see Figure 9.47[f]) requires the clasp to be dimensioned exactly to fit a given binding; commissioning such unique fastenings would involve extra costs and therefore be restricted to luxurious bindings, exemplified by the Nuremberg girdle book (see Figure 9.40); however, most all-metal fastenings date from a later period. A special feature, related to fastenings, is a kind of 'stabilizer' consisting of a metal tenon reaching from the lower cover across the fore-edge, fitting – when the book is closed – into the mortise mounted on the edge of the upper cover. Obviously the purpose was to stabilize a heavy book in perpendicular position by preventing sideways shifting; published examples come from Northern Germany (Miner 1957 no. 145, from 1475; Dag-Ernst Petersen 1975 pl. XIII, s. xv). Finally, there were many instances where the fastenings had the task of literally keeping the book closed and were adopted accordingly. The earliest example was noted by Adam (1923b): the council of the City of Cologne had recorded the taking of oaths in a particular volume, dated 1341, that had been furnished with a lock, recessed in the thick (17 mm) upper board; its key was kept in the custody of three councillors. Bohemian examples, mostly land registers from the fifteenth and sixteenth centuries, are cited by Hamanová (1959 p. 55, fig. 35) and Nuska (1965 p. 55, pl. III). Hartmann (1987) describes four such German examples dating from between 1446 and 1536, among which is a paper manuscript dealing with gun powder and medical recipes, the lock of which is concealed in the inside of the upper board (BSB Cgm 399).

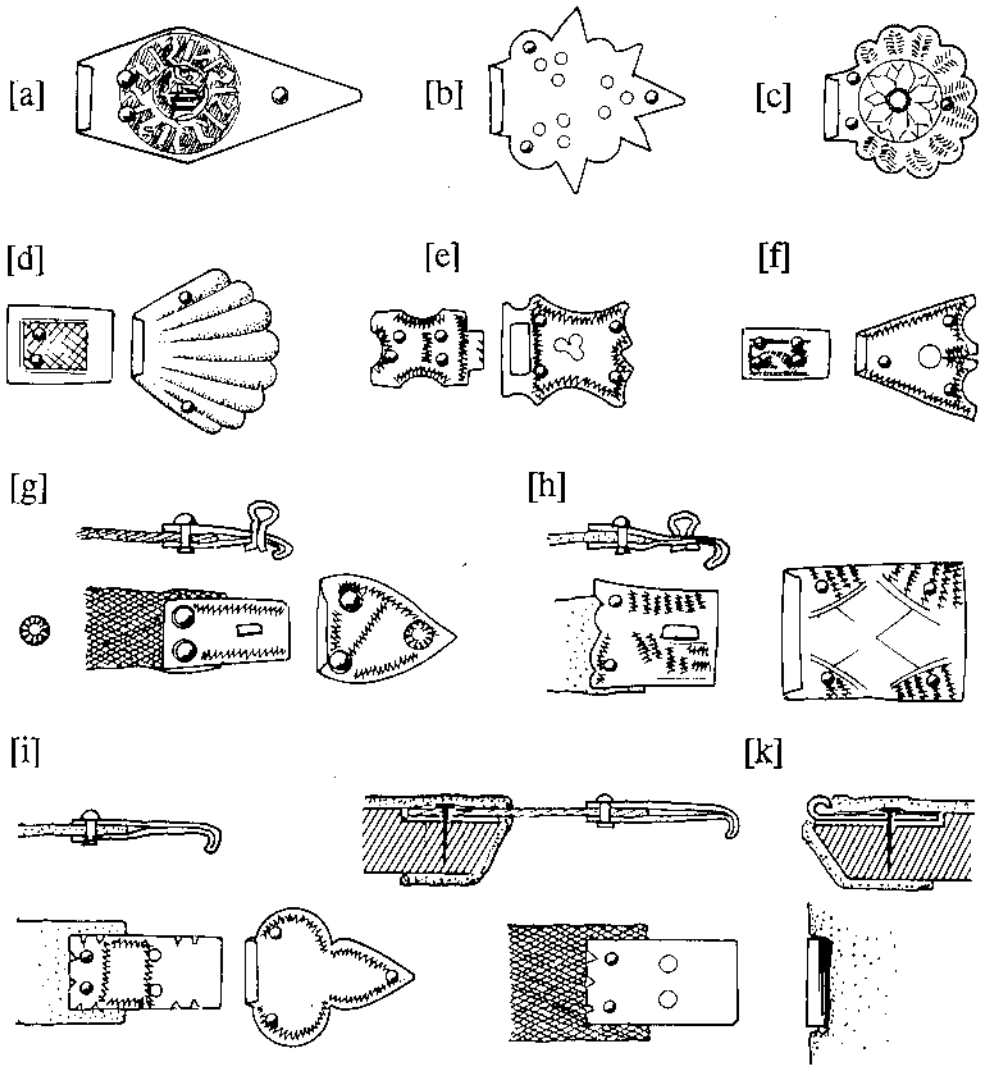


Figure 9.54 Hook-clasp fastenings on Italian and French bindings. Roll catch plates after De Marinis (1960): [a], Naples BN vii.G.61, Naples, 1458; [b], BL Add. 22316, Naples, 1481; [c], private collection, Florence, 1481. Fastenings on sixteenth-century Italian bindings (after Dürrfeld 1992): [d], BL 108.d.4, Venice, 1509; [e], BL 108.g.15, Paris, 1516; [f], BL 129.d.20, Venice, 1509. French fastenings (after Carvin 1988): [g], Marseille MS 67; [h], Carpentras MS 951. Italian type is also [i] (Budapest UL Inc. 7, Rome 1472), which is also one of the main types on Corvinian bindings; [k] is the inserted roll type (after Horváth and Tóth 1993; OSzK Cod. Lat. 358). The straps of [g] and [k] are woven ribbons.

9.12 FURNISHINGS

In contrast to fastenings, which are common on the majority of gothic bindings, protective furnishings occur less regularly. Their presence depends in part on the contents and the dimensions of the book and the particular circumstances of its use and storage. Usually the covers of heavy liturgical books had their covers protected with metal bosses or corner pieces and their edges with metal guards; similarly, frequently used works and books to which the public had access, such as those laid out on the lecterns of chained libraries, were likely to have received such protective devices. But customs may have differed locally: the bindings in St Gall Abbey were never provided with any furnishings, though virtually always with fastenings; in contrast, Kyriss (1940) observed that almost all monastic workshops in Nuremberg (Dominicans, Augustinian friars, Carthusians) furnished all of their bindings with bosses or corner- and centre pieces.

In the case of fastenings it may often be ascertained whether or not they were original attributes: recesses in the board to accommodate the straps and/or catch plates obviously had to be cut into the board before covering and thus give evidence for the binder's intention to provide the binding with fastenings; however, fastenings might as well be a later replacement or addition. This is even more feasible with elements of furnishing, which easily could have been added later; they also can antedate a binding considerably, since old furnishings were often reused after rebinding, particularly in the case of liturgical works. In other words, furnishings are not a very reliable clue to dating and locating a binding.

In Figure 9.55 the main types of protective furnishings are presented. Bosses of various shapes, [1] to [5], were cast of bronze or worked from sheet metal using die blocks and ball punches; their nail was either cast simultaneously or a separate nail fixed with solder – sometimes the rim had holes for several nails, [2]. Cast bosses were often mounted on corner pieces made from sheet metal, [7] and [8]; but corner pieces were also made entirely from metal sheet, including a half-dome, [9], or cast in one, [10]. The main variations in the shape of corner and centre pieces, largely mass-produced from sheet metal, are shown in sketches [11] to [15]. Shoes protecting the corners of the covers, [16] and [17], were common on heavy volumes (especially in Germanic countries); sometimes the tail edge of the covers was additionally provided with heels, [18] to [20]. Metal frames (*fenestrae* [21]) were nailed over title labels of parchment, usually protected by horn; their position indicates the side of the volume facing upward on the desk or pulpit. Occasionally only one of the covers is protected with bosses and/or skids [23]. Edge guards [22] may be taken around the whole cover.

Metal was certainly the most frequently used material for furnishings. Iron, both solid and sheet iron, was used on early gothic bindings; it can be found with wrought centre and corner pieces but also as edge guards and heels on large and modest liturgical works, especially in Southern Europe. Yet, a few examples from thirteenth- and fourteenth-century Germany are mentioned by Müller (1991). Cast bronze bosses were the earliest furnishings on romanesque bindings (see section 8.11 and Figure 8.22) and continued to be used on gothic bindings; they often occur in Germanic countries in combination with corner guards

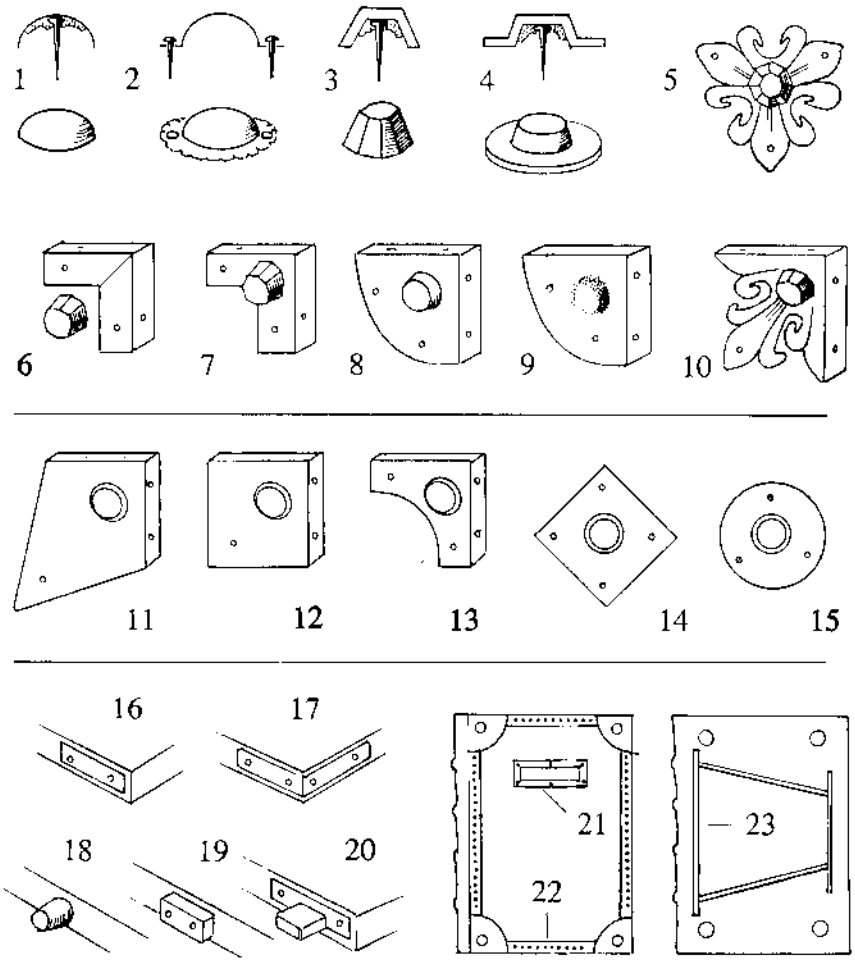


Figure 9.55 Metal furnishings on gothic bindings: (1) to (5), bosses; (6) to (10), bosses combined with edge guards or integrated into corner pieces; (11) to (13), mass-produced stamped corner pieces and centre pieces (14) and (15) with integrated bosses. Shoes (16) and (17), heels (18) and (19) and heeled shoe (20) on the tail edge of the board; (21), frame to protect title labels; (22), full-length edge strips; (23) skids.

(Figure 9.56), or were integrated with cast centre and corner pieces of types [5] and [10] in Figure 9.55, decorated with floral elements or fantastic beasts. Kempf (1901) described a series of such furnishings on bindings from the Freibourg area (Rhineland); Bock (1928) referred to cast furnishings, underlaid with red sheepskin, on bindings made by the Dominicans in Nuremberg in the 1450s. In his comprehensive work on Nuremberg goldsmiths Kohlhaussen (1968 pp. 104–217, figs 179–81) devoted a whole chapter to book furnishings, especially the cast types, and noted that even Albrecht Dürer is credited with having designed such furnishings in the 1520s.

The laborious and thus expensive procedure of casting furnishings gradually gave

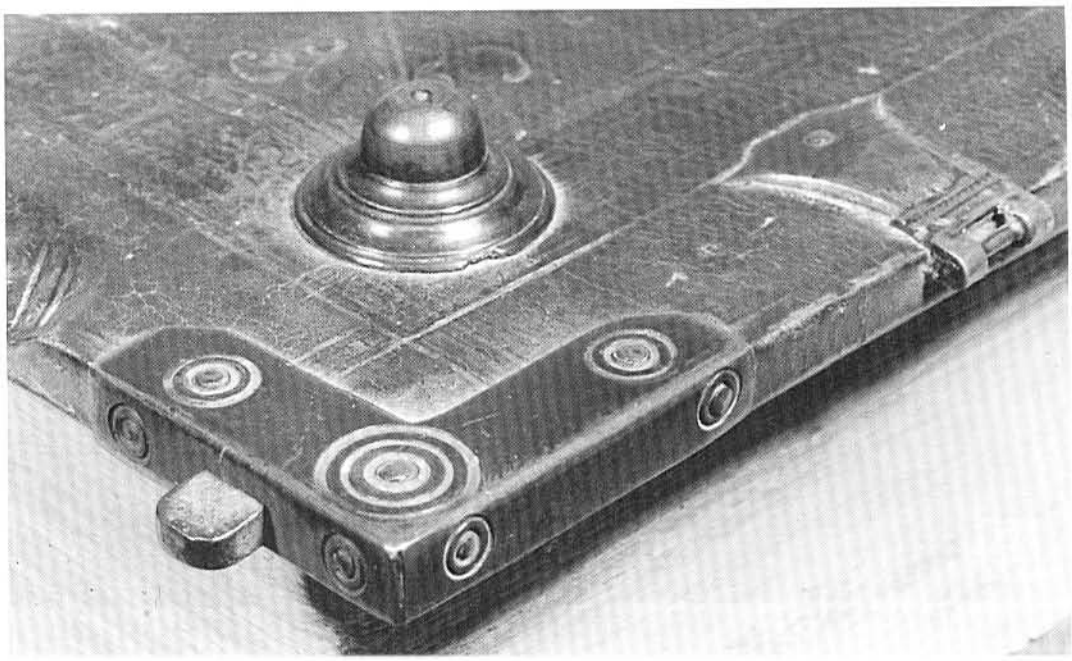


Figure 9.56 Cast and turned boss of bronze, decorated brass corner guard with heel of iron (detail of Figure 9.41, Libr. M 453).

way to working them from sheet metal, mostly made of copper alloys. At first, they were individually made and decorated by hand with a variety of techniques, such as engraving, punching (on the front) or repoussé (from the back) and forming a half-dome using a dapping-die (Figure 9.57[a]). But obviously the growing market demanded faster and cheaper procedures, so that later corner and centre pieces were cut and embossed over dies, producing decoration and the half-dome by a single pull of a press or by a blow with a tilt-hammer, [b]. But perhaps the half-dome made of only a thin metal sheet was not always considered robust enough, for a great many of mass-produced centre and corner pieces are provided with cast bosses, [c]. Furnishings of this kind, most of them purportedly mass-produced in Nuremberg, became a characteristic feature of gothic bindings, not only in the Germanic area but throughout the Continent, suggesting that they had been common articles of merchandise (see also note 62). Such furnishings were usually anonymous mass products, but sometimes initials or other hallmarks are incorporated into the embossed design, [d].[61]

It was mentioned earlier (section 9.8) that the type of furnishing and the kind of outer board profile seem to be interrelated: corner pieces require a square profile (full-length or interrupted). Even so the square edges of corner pieces appeared to be problematic on the spine edge of the cover: they not only might interfere with the full opening of the covers, thus cancelling any benefit of the bevelled spine edge, but they could also cause damage to the covering and endanger the attachment of endband supports. To prevent any

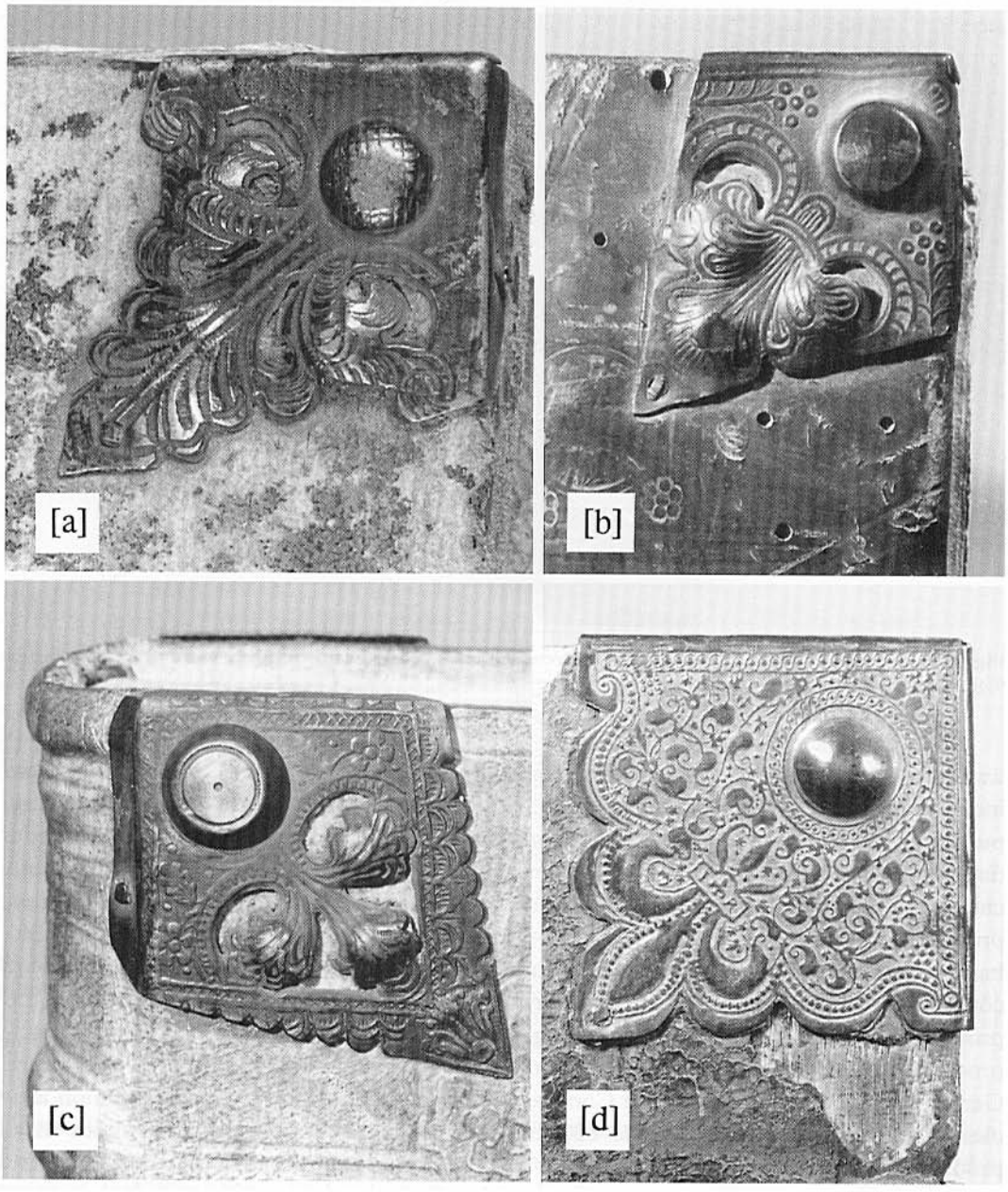


Figure 9.57 Four variants of brass corner pieces: [a], individually cut, decorated with different chasing punches (The Hague girdle book MMW 1 F 50, Nuremberg imprint of 1484, bound in Germany); [b], stamped with flat boss and decorated relief made in one operation (Utrecht MCC BMH sj 52, Basle imprint of 1485, bound in the Netherlands; [c], stamped as in [b], but separately cast boss added (Amsterdam UB Inc. 69, 1486 imprint bound in Germany); [d], flat corner piece with half-dome boss and decoration stamped in one operation, with hall-mark IR (Libr. M 240, Frankfurt imprint of 1620, bound in the Netherlands).

such risk the binders found various remedies: the spine edge of the corner piece was cut off completely, the corner of the square edge of the corner piece was cut open and the spine edge bent backwards or a half-round recess was filed into the edge of the corner piece where the endband support was laced in.

* * *

Materials other than metal were used occasionally. Kyriss (1957 p. 13) mentions horn and wood; of about 40 bindings with furnishings in the Zutphen Librije seven are fitted with turned wooden bosses. Bone was used for bosses on some Scandinavian bindings, such as on examples from Vadstena Abbey in Sweden (Henschen 1920; Andersson-Schmitt and Hedlund 1989). In the Zutphen Librije I observed heels of small blocks of bone, fixed with two nails (Libr. M 111, Paris imprint of 1513). Two wooden laths, parallel to the spine and nailed to the upper cover of the large Gradual (620 × 400 mm; Amsterdam UB IV A 49) are obviously meant to prevent damage to the cover while it is resting on the lectern; these laths appear to be the predecessors of the half-round brass skids (see Figure 9.55 [23]), often used in Germany, notably around Bamberg and Erfurt (D.-E. Petersen 1975 pl. XXXII).

* * *

Information is still too scarce to allow more than a general review of the chronology and any geographical singularities of book furnishings. Cast metal seems to have preceded the mass-produced products of sheet metal, which probably appeared in the second half of the fifteenth century, along with markedly increased book production. Excavations at the Royal Castle of Buda prove that damaged furnishings of both the cast and sheet-metal type had been replaced in the Corvinus workshop in the 1480s; the occurrence of damaged centre and corner pieces usually described as 'Nuremberg wares' among these finds are evidence that they had been on the market for some time (Irás-Melis 1974; 1980; 1985). They can be traced throughout Central Europe, on bindings from places like Cracow, Gdansk, Prague and Vienna (see section 9.11). They were quite common in Northern Italy, called even '*cantoni tedeschi*'; several examples are illustrated by De Marinis (1960 vol. 2, p. 45; nos. 1093, 1719, 2578 and 3010), on imprints from Milan, Venice, Florence and Rome respectively and dating from 1476 to 1546).

* * *

Finally, though protective in a different sense, another kind of book furnishing should be included, namely the chains which fastened books to lecterns and bookshelves in late medieval libraries. The chains, made usually of wrought iron, smooth or twisted, but occasionally of brass, were of varying lengths, depending on the library's particular type of housing of books. They were fixed to one of the covers by means of a clip or staple, fastened with one or more nails or rivets; to prevent entanglement, swivels were often incorporated in the middle or near either end of the chain.[65] Except for a few completely preserved chained libraries (Cesena and Florence in Italy, Hereford in England and Zutphen in the Netherlands), the chains and clips or staples have been mostly removed and only marks and

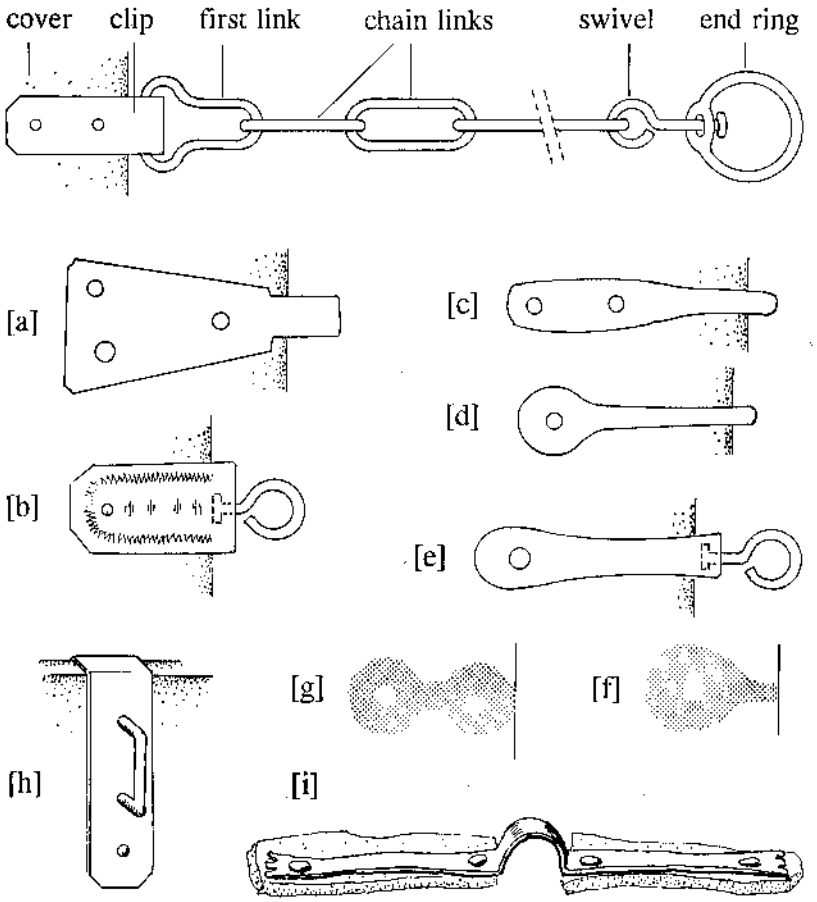


Figure 9.58 Furnishings on chained books. On top is the standard iron chain at the Zutphen Librije, with a clip of copper sheet, pear-shaped first link and the swivel combined with the end ring. Below, variants of the chain attachment on various other extant examples: [a], triangular clip (Libr. M 10/3); [b], clip with swivel (The Hague KB Edam 15); [c] wrought clip with two rivets (Cambridge UL Pembroke 101); [d], wrought clip with one rivet (OSzK RKM III 165); [e], wrought clip with swivel (Zurich ZB Car. C 180); [f], imprint of a clip with one rivet (BSB Clm 6261); [g], imprint of a clip with two rivets (ÖNB Cod. 458); [h], brass clip with a staple (Leiden UB BPG 37); [i], staple for chain attachment on the lower cover of Oxford New College MS 49 (after Ker 1950–1).

scars testify to their former application. Figure 9.58 illustrates the basic construction of a chain and various types of its attachment to the binding.

The position of the chain attachment to the cover shows considerable variation, reflecting the library's storage system. The classical studies of Blades (1892), Clark (1902) and Streeter (1931) clarified to a great extent the evolution of library furniture. The earliest 'lectern system' was set up on the model of liturgical works chained in church choirs: the books were put down on the sloping desks of the lectern, their chains strung upon iron bars running above the desk (Figure 9.59[a]). Although the most convenient place to attach a chain to a binding was the top edge of the lower cover, it was sometimes preferred to have

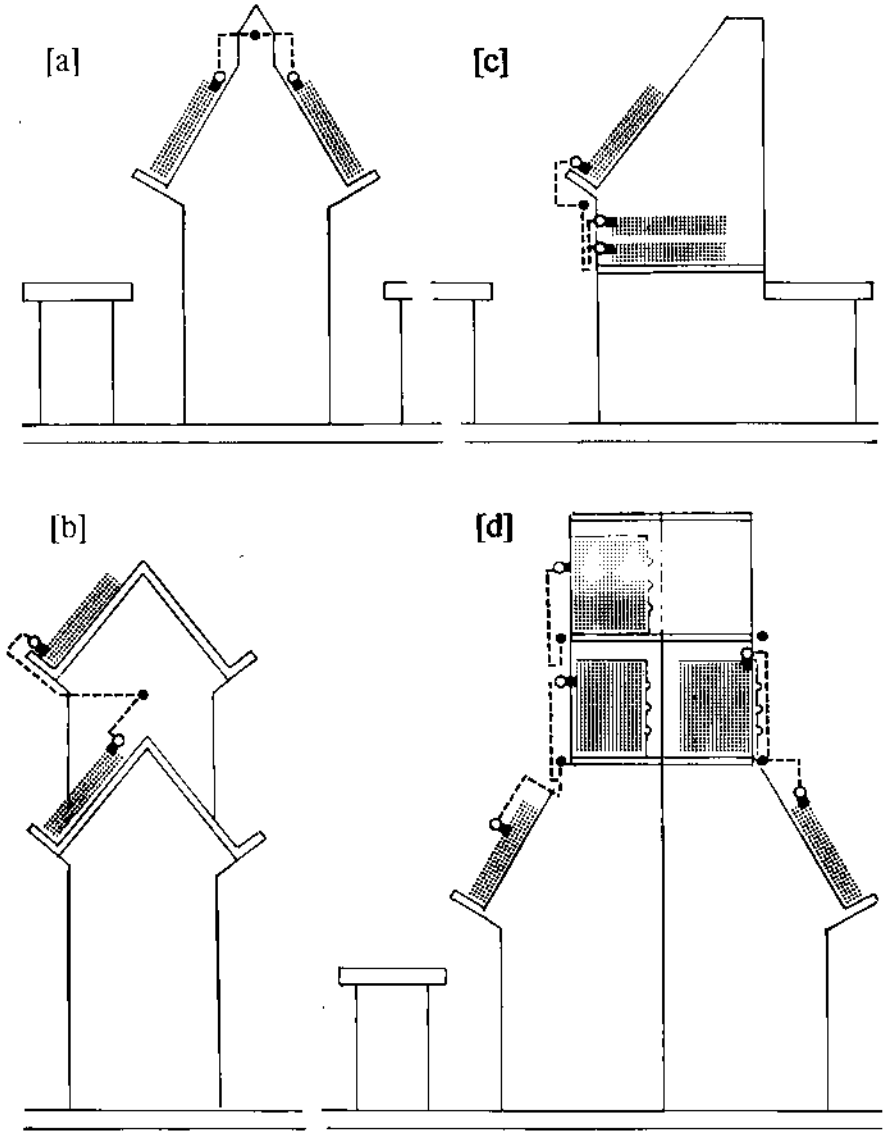


Figure 9.59 Variants of lecterns in chained libraries: [a], single lectern with the securing iron rod above (Zutphen Librije); [b], two-storied lectern, with the rod in between (Cambridge, Queens' College); [c], lectern with one book shelf underneath and the securing rod below the desk (Cesena, Malatesta Library); [d], lectern with shelves above, with the rod in front of each shelf (Enkhuizen, Westerkerk); (modified after Clark 1902 and Streeter 1931).

the book lying with the lower cover uppermost, hence the chain clips were sometimes attached to the top edge of the upper cover (Derolez 1985). There were also 'two-storied' lecterns (Streeter 1931 pp. 27–32), with a single rod in between, mutually shared by the bindings on either desk, [b]; the bindings on the upper desk had their chains fastened to the tail of the covers, and those on the lower, to the head of the covers.

The increasing number of books asked for more economical storage systems: the next step to create more storage room was to place shelves under the desk, [c]. The chains were bolted by clips sunk into the tail edge of the lower cover, in the middle or close to the spine (Clark 1902 figs 96, 107). This system was adopted in the Malatesta Library of Cesena, built in 1452, and in the Bibliotheca Laurenziana in Florence, designed by Michelangelo and opened in 1517 (Clark 1902 pp. 193ff.). Another means of increasing the storage capacity of the lectern was to construct one or more shelves above the desk, where books not in use stood upright on their tail edge (Figure 9.59[d], left half). In this so-called 'stall system', the books were usually shelved with their fore-edges facing outwards and the chains attached with a simple clip to the front edge of either cover. This is the arrangement of the chained books on the relocated but original stalls of Hereford Cathedral Library, dating from the early 1600s (Clark 1902 fig. 73; Streeter 1931 pp. 51 ff.). Later the books were turned round, exposing their backs as customary today; in this case the chain attachment had to be on either cover close to the back (Figure 9.59[d], right half).[66]

As a rule, the place of the chain attachment would be consistent throughout a given storage system: the bindings of the Zutphen Librije have all chains attached in position [a] in Figure 9.59. In the same position are the clip marks on all extant bindings of Salzburg Dombibliothek (conforming to [f] in Figure 9.58); I observed marks left by clips of type [g] on around 20 bindings from Freising Dombibliothek. But two alternative positions for the chain attachment can occur on holdings of the same library, as is the case with the two-storied lectern system of Bury St Edmunds and that of Pembroke College, Cambridge: in both instances clasps of type [c] in Figure 9.58 can be found either on the head or tail edge of the upper cover. The same book may have several different chain marks, which could indicate that a rearrangement of a library had taken place, such as abandoning the lectern system in favour of stalls or moving the library to another location. In some instances we can reconstruct such events: the bindings of the Amsterdam Nieuwe Kerk Library first had the clips at the front edge of the cover, the books standing on shelves with the fore-edge turned outwards; after moving the Library to a new location in 1632, the books were placed with their back in view, and the chains were re-attached correspondingly.[67]

A systematic study of chaining systems of the considerable number of medieval and post-medieval libraries could be helpful to clarify the origin of so many not yet dated and located bindings. For England, the studies of Blades (1892), Clark (1902), Streeter (1931) and Ker (1951–2) contain a wealth of building blocks for such studies; on the Continent little fundamental research has been undertaken so far. In this connection the work of Germann (1994) should be mentioned, who was able to identify the books of the post-Reformation Stiftsbibliothek of Zurich, originating from various monastic libraries, on the basis of the place of attachment of the chains. The regular occurrence of marks left by an

unusual chain attachment on a series of books from Buildwas Abbey provided additional evidence that they once belonged to the same chained library (Sheppard 1995).

9.13 FUNCTIONAL ASPECTS

Gothic binding represents the final phase of the evolution of the Western wooden-board binding. Comparing it with the early carolingian bindings of the eighth century, a number of significant changes can be observed in their general appearance, internal structures and in the materials used. The most conspicuous changes are: (a) the transition from the flat to the rounded spine; (b) the introduction of animal glue; (c) various modifications of the board attachment; (d) a greater variety of the profile of the board edges; (e) the appearance of squares; (f) preference for new materials, like vegetable-tanned leathers of calf and goat and alum-tawed pigskin and (g) a gradual decline in standards by application of inferior materials (like poor sewing thread) and faster working procedures (like short-cut end-bands).

Only in some measure are the reasons behind the various evolutionary steps understood: cutting down on the quality of material and workmanship was undoubtedly the indirect consequence of the increase in book production, forcing the binder to compromise in order to stay in business. In contrast, the gradual rounding of the spine (Figure 9.60) is such a complex phenomenon that it seems hard to grasp all the manifold factors involved. In section 9.5 it was argued that giving the spine a rounded shape was, at least partially, achieved by deliberate mechanical action, and that swelling due to the thickness of the sewing thread did not initially play a major role; it was also pointed out that the introduction of paper had no influence on the rounding, for it had already started in the parchment

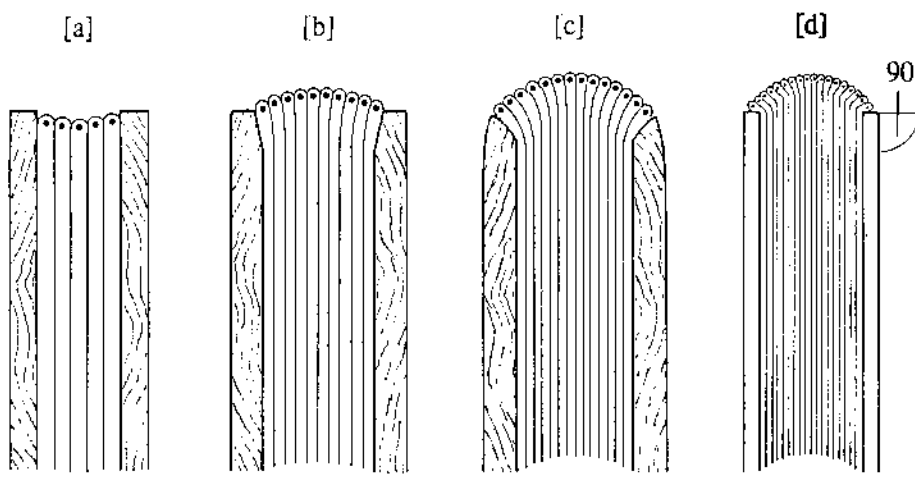


Figure 9.60 Diagram showing the evolution of the spine shape and board edge profile from the early flat carolingian codex [a], through gradual rounding [b] and [c] to the tight joint of the renaissance binding [d] (from Szirmai 1990–1).

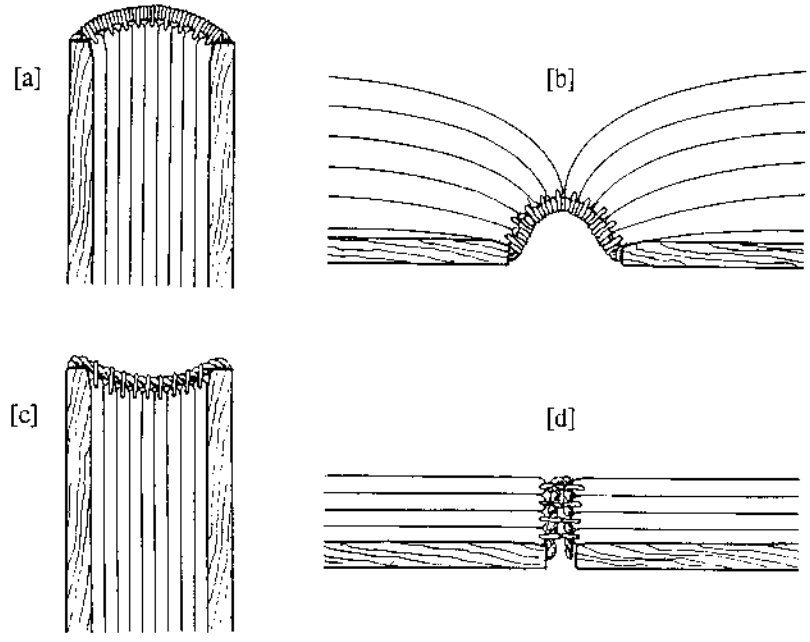


Figure 9.61 Diagram showing the effect of packed straight sewing on stabilizing the rounded spine shape [a] and on the opening arch [b] in gothic bindings, in comparison with the easily distorted spine [c] and the much sharper opening arch [d] of carolingian and romanesque bindings with straight sewing (partly after Szirmai 1990–1).

period and that the use of animal glue for affixing the spine lining had been of considerable importance in maintaining the round spine shape.

Yet several other factors contributed to the round spine shape and consequently to its function. Hereto, packed straight sewing had been an important innovation in two respects. First, it had helped to create a rounded spine by wrapping the sewing support with a sturdy and relatively incompressible outer layer of tightly packed thread, the reinforced support acting as a rib of a vault in protecting the spine from bulging towards the front, in contrast to the single sewing where the support easily gave in (Figure 9.61[a] and [c]). Secondly, packed straight sewing had essentially influenced the spine function: on opening the book, packed sewing softened the arch and allowed for a more even distribution of stress across the spine (Figure 9.61[b]); when straight sewing only is used, the opening arch was sharp, putting more strain on the sewing structure [d] (see sections 7.10 and 8.12 for these phenomena on carolingian and romanesque bindings).[68]

But just like the rib of a vault, which can only function when buttressed by pillars, the rounded spine needs to be supported to be able to safeguard the stability of the book shape. Here another of the aforementioned factors comes in, namely the profile of the board edge along the spine, as well as the shoulder of the bookblock. The square profile of carolingian and romanesque bindings did not offer any substantial resistance against the tendency towards concave distortion of the flat spine (see section 7.10 and Figure 7.32),

though the geometry had allowed an unrestricted opening, that is, unfolding of the leaves (see sections 7.10 and 8.12 and Figure 7.34). The gradually increasing inner bevel of the board edge and the concomitantly more and more pronounced shoulders of the bookblock provided support for the rounded spine: the more oblique the inner bevel, the more effective its shoulder support, reaching the optimal assurance of permanence of the rounded and backed spine with the 90° shoulders as finally realized in the renaissance binding (Figure 9.60[c] and [d]). Likewise the bevelling or rounding of the outer face of the board edge along the spine was an important advance, since the pointed board edge gave more freedom for the opening of the book. Naturally, the improved hinging required a new way of lacing for the slips of the sewing supports, which, now with the board edge having become thinner, had to be taken over the board edge rather than through its thickness as had been the case in the carolingian and romanesque bindings. The gothic spine edge profile was a change for the better, provided the leather covering remained sufficiently strong and resilient to sustain its hinging function. Remarkably, the advantage of the pointed board edge along the spine was often obliterated by leaving the profile of the corner area square to accommodate the cheap mass-produced corner pieces (see section 9.8 and 9.12); even more strangely, such partially bevelled boards often remained without corner pieces at all – evidently out of a sense of tradition.

Although we have at least some insight into the factors involved in the evolution of the rounding of the spine, the reasons behind it remain obscure. What was actually envisaged by the binder when introducing the modifications that contributed to this development? Why was the carolingian sewing support of cord abandoned and replaced by the heavy leather thongs, to be replaced again, towards the close of the fifteenth century, by cord? Did the countless variants of board profiles serve any specific purpose? What was the intention of squares, which became one of the contributing factors to the concave distortion of the spine? And was the rounding of the spine genuinely meant as a measure to secure the stability of the book once it had become the custom to shelve them vertically? Indeed the latter reason seems unlikely: why should the St Gall binders have bothered to form the early carolingian manuscripts into a rounded book which continued to be stored horizontally as can be deduced from the contemporary shelf-mark labels (see Figure 9.7)?[69]

Though we are not always sure of the reasons, we can see to some extent the results of these innovations. The rounding of the spine successfully enhanced the overall and lasting stability of its shape, particularly for vertical storage. But reading the book was not made easier, to say the least; the rounded spine of the heavy volumes was virtually immobilized by the animal glue which became rock hard with time (Figure 9.62[a]). Full opening is also hampered by another factor, namely the interlocked first and last quires of the rounded and backed bookblock: while instrumental in the stability of the closed book, this interlocking must first be released before the leaves can be unfolded (Figure 9.63). Full or complete opening to the centrefolds becomes impossible even with extreme mechanical force, and the inner margins remain closed to the reader.

Whereas for works on paper the adverse effect of the extremely stiff rounded spine remains merely a nuisance, it is a rather serious problem for parchment manuscripts. Parchment needs freedom of movement: exposed to fluctuations of relative humidity, it has

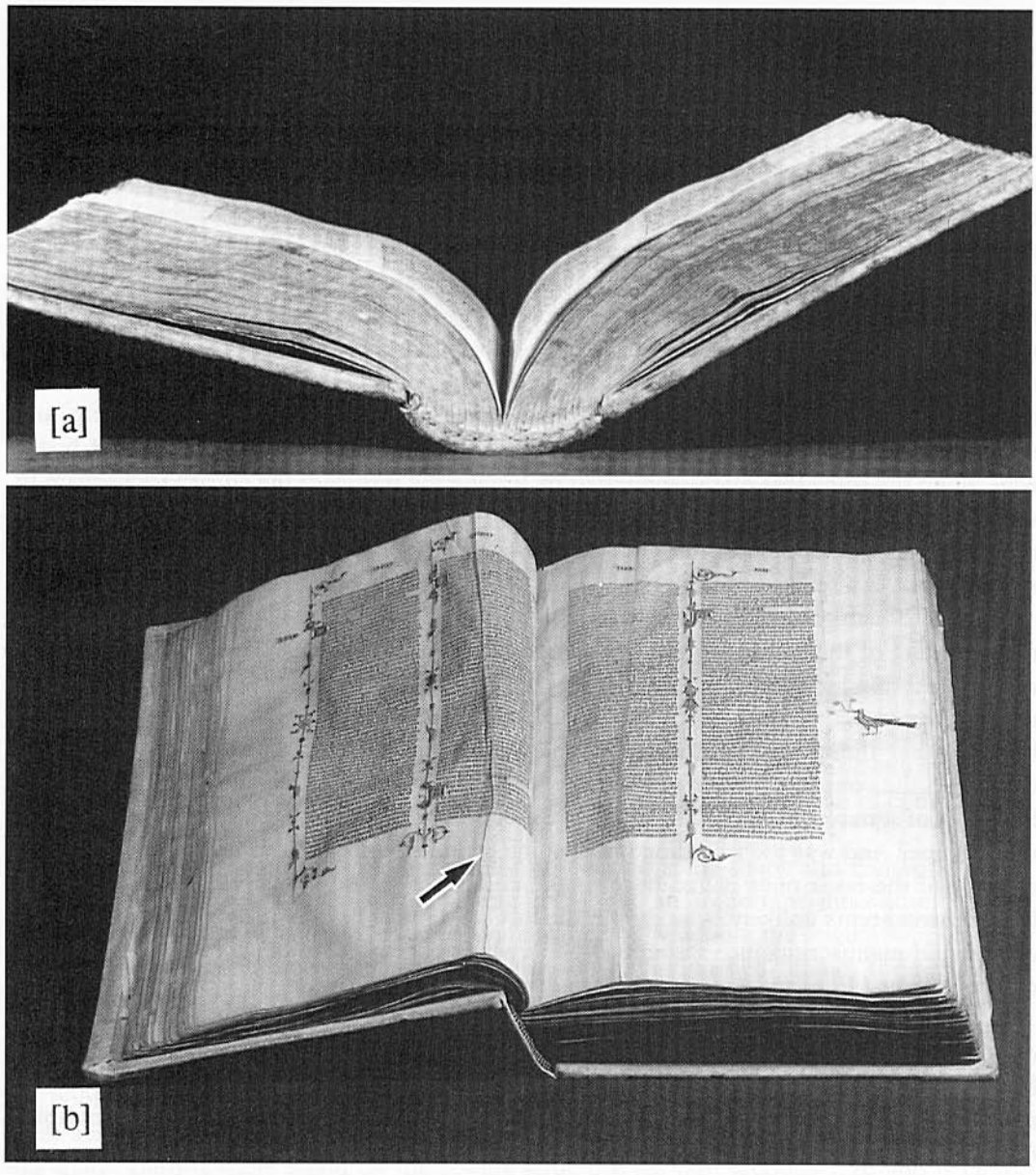


Figure 9.62 Effects of a stiff rounded spine: [a], complete opening of the book is hindered and only possible with mechanical force (SG Cod. 1079, paper manuscript from 1464); [b], repeated bending leads to permanent creasing (arrow) and even cracking of the parchment, thus damaging script and illumination (Leuven, Library Theological Faculty MS Mechl. 1, Italian parchment manuscript, s. xiv^{ex}).

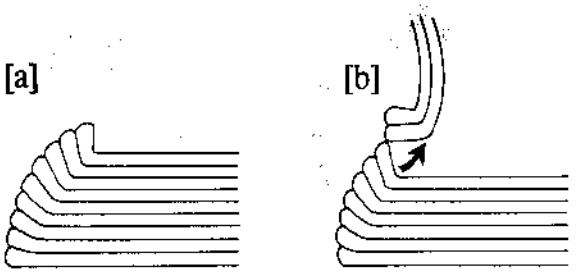


Figure 9.63 Diagram showing how [a], backing of the rounded spine interlocks the quires and helps the book to keep its shape; [b], with some force the interlocking must be released first, before the leaves can fully unfold; (from Szirmai 1992d).

to be able to stretch and contract; if prevented from doing so by being embedded in glue, distortion is a consequence: folding of the parchment leaves, starting at the spine and fanning out to the free edges, is the result. But even worse: instead of unfolding in the centrefold, the leaves must be bent, with some force, at some distance from the centrefold. This in turn leads to an undesirable rubbing of the leaves against each other – with fatal results for script and illumination – and leading ultimately to folds and even cracks in the parchment (Figure 9.62[b]). Thus the gothic binding structure, thoughtlessly forced upon earlier parchment works from the fifteenth century onwards, remains an inherent danger for precious manuscripts to the present day. Another adverse effect of animal glue can be observed on the spines of rebound manuscripts of Würzburg Dombibliothek (Würzburg UB Mp.th.f. 5 and 21, mid-fifteenth century); sharp splinters remaining from the once continuous, thick but now broken, layer of glue have cut the sewing thread at the exit point of the sewing holes.

However, not all gothic bindings must be condemned: what appears, in retrospect, unsuitable for books on parchment, was generally beneficial for works on paper. The intelligent application of available means, the expertise of many binders in avoiding poor materials and practices, have left us a multitude of bindings which, even after hundreds of years, have preserved their material integrity and optimal function. Figure 9.64 (see p. 276) illustrates one of the many examples of a perfect late gothic binding: it has preserved its fastenings which have greatly contributed to maintaining its physical properties; even though its pigskin covering might have become slightly stiffer, its modest rounding and an evidently restrained application of adhesive on its spine have fully safeguarded its outstanding functioning to the present day.

NOTES

1. 'Onward and Downward: How Binders Coped with the Printing Press before 1800', by Nicholas Pickwoad (1994), gives an excellent overview of the decline of the standards of binding techniques since the Middle Ages.
2. I consulted the unfinished manuscript by Paul Adam on the history of bookbinding, dating from the early

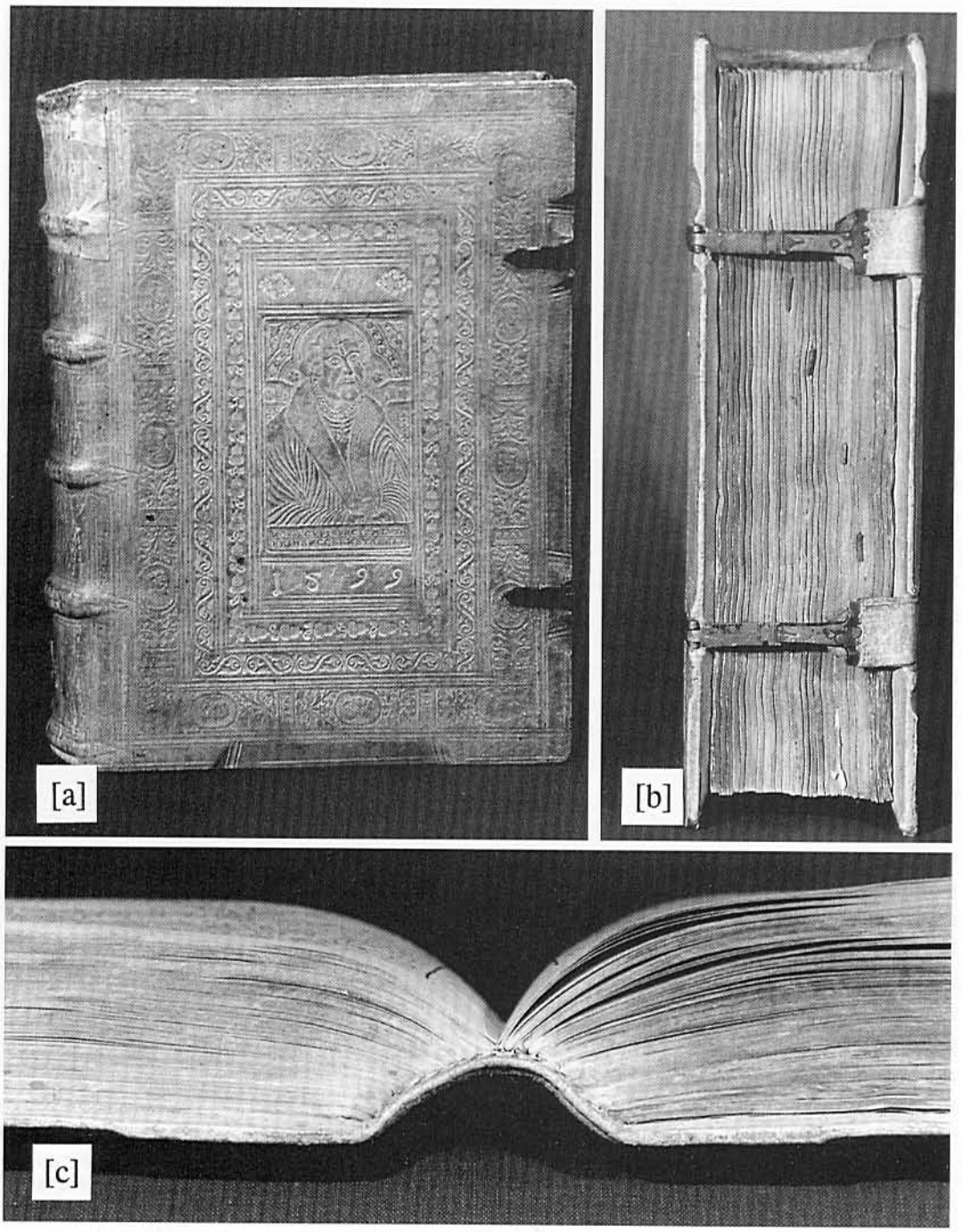


Figure 9.64 A well-preserved late gothic binding with moderate rounding of the spine, covered in alum-tawed pigskin and with blind tooling: [a], upper cover; [b], fore-edge and two hook-clasp fastenings; [c], perfect spontaneous opening (Tübingen UB Mb 10, paper manuscript bound in 1599).

1930s, kept at Düsseldorf KM. Dr Konrad von Rabenau kindly informed me that the virtually completed work on the history of bookbinding techniques by Adolf Rhein from the late 1950s is kept in the Erfurt WAB; I was unable to see it.

3. Bücking's manual (1807) contains a detailed description of the bindings required for the master's examination, including a gothic binding of a Bible, with the obligatory decoration of a central panel and a set of ornamental rolls. Frisius' (1708) account on the ceremony of awarding the master's title describes the making of a gothic binding, which the candidates had to recite. Young binders kept complaining of the economic loss, since they were unable to sell those outmoded wooden-board bindings (Helwig 1962–5 vol. 2, pp. 18ff.).
4. Carvin's (1988) study is based on 130 bindings, dating from the fourteenth (29 per cent) and fifteenth (71 per cent) centuries, kept in libraries – not further identified – in Aix-en-Provence, Avignon, Carpentras and Marseille. Since not all data are presented, the relationship between the various traits cannot be analysed and dates are often impossible to determine; this diminishes the value of this brave effort (for a critical review see Gullick 1990).
5. I studied gothic bindings of St Gall StfB between 1989 and 1992, beside bindings from Schaffhausen SB and Zurich ZB. In Germany, I studied gothic bindings in Berlin SBK, Düsseldorf KM; Erlangen-Nuremberg UB, Halle ULB, Karlsruhe BLB, Munich BSB, Nuremberg GNM, Tübingen UB, Wolfenbüttel HAB and Würzburg UB. In Austria, Vienna ÖNB, Graz UB and Kremsmünster StfB; in Hungary, Budapest OSzK and UL. In the Netherlands I studied bindings in Amsterdam UB, The Hague KB and MMW, Deventer AB, Leiden UB, Nijmegen UB, Utrecht UB and MCC and Zutphen, Librije St Walburgskerk. In England, I studied bindings in London, BL and V&A, Cambridge UB, Hereford CL, Oxford, Bodley and Shrewsbury The School Library, and in New York, The Pierpont Morgan Library. The studies were carried out between 1986 and 1994.
6. The chained library 'De Librije' in Zutphen was established in the 1560s in a building set against the outer wall of the choir of the Church of St Walburga; the construction of the room and of the lecterns was made on the models of local monastic chained libraries dating from the fifteenth century (Clark 1902 pp. 147–53; Streeter 1931 pp. 9–12). The first catalogue of 1566 listed 347 volumes of which some 100 are still extant in their original binding (Meinsma 1902 pp. 293–311); nearly half of these bindings can be attributed to local binders from neighbouring towns (van Dongen 1984 pp. 137–212).
7. The refurbishing of monastic libraries in the fifteenth century was one of the sequels of reforms initiated by the Councils of Constance (1414–18) and Basle (1431–49). In St Gall repair and rebinding probably started after 1436, when reform monks from Hersfeld, Kastl and later from Wiblingen joined the Abbey. The operation was completed by 1461 when a new catalogue was made (Scherrer 1875 pp. 470–1); about 40 bindings were repaired and about 130 completely rebound, while 110 escaped rebinding (Szirmai 1992c; 1995). In Reichenau only some 20 bindings had managed to survive refurbishing in 1457; all but two fell victim to later restorations (see Chapter 7, note 2). The radical rebinding of the carolingian manuscripts of Salzburg Dombibliothek around 1430–5 spared only six or seven bindings (Unterkircher 1954; Mazal 1977); out of some 80 extant manuscripts of Würzburg Dombibliothek no more than two escaped rebinding in the fifteenth century (Endres 1936). According to van Regemorter (1951) none of the manuscripts of St Bertin survived in their original bindings; in his 1482 library catalogue the Abbot of Citeaux declares proudly that the books were repaired and rebound after two years of continuous labour by two or three binders (Zaluska 1989 p. 33); I owe this reference to Michael Gullick.
8. In his collection of 'Gothic and Renaissance Bindings' Goldschmidt (1928 pp. 13–16) noticed a striking overrepresentation of German material, on which he remarks that 'It would have been easy [. . .] to collect fifty Bavarian specimens for every one French monastic binding I possess'. He examined the possible causes of this discrepancy, such as relative political stability of Germany in contrast to France and England, the greater wealth of South German abbeys and different degrees of destruction in subsequent periods; however, his study might have been biased by his preference for decorated bindings.
9. From a total of 2500 copies of the Nuremberg Chronicle completed by Koberger in 1493, the inventory taken 16 years later lists 524 as unbound and 34 as completed bindings; this demonstrates that several decades could easily have elapsed before books in sheets were bound (Wilson 1976 p. 236). Van Dongen (1984) reconstructed from the church accounts that out of the 31 bindings commissioned for the Zutphen Librije between 1562 and 1574 only six were bound within three years of their publication; from his data it appears that the remaining 25 bindings suffered a time-lag of between 9 and 45 years.
10. The earliest detailed description of sizing and beating is by Faust (1612; see 1987 pp. 50–55) and by Zeidler (1708 pp. 21–32, 55–60). Documentary evidence for the process of 'flattening' the sheets (German: *planieren*) dates from 1491, when *Planierer* or *Blanierer* is mentioned as an occupation; the costs for this work on a

binding of a 1492 incunable are specified as '*pro 1 fl. dedi ligatori 4 gr. 4 pf. planatori 1 gr*' (Rhein 1943; Helwig 1962–5 vol 1, p. 33). The 1512 inventory of the bindery of the Cistercians in Heilbronn lists '*I grossen planirhamer*' (Lehmann 1929–30); a binder's inventory in Nuremberg from 1530 contains '*zwei Schlaghämmer, ein Schlagstein, eine Planierpresse mit 20 Paar Brettern*' (Helwig 1941) and a similar inventory from Cambridge of 1545 'a planynge presse with lxij planyng boards' as well as 'a betynge hammer' (Gray and Palmer 1915 p. 27). The beating stone and hammer are illustrated in Jost Amman's *Beschreibung aller Stände* from 1568; Comenius' *Orbis sensualium pictus* (1658) shows a binder's shop with sized sheets drying on a cord (see also Middleton 1963 pp. 253ff.).

11. In the fifteenth century binders started to use outdated or illegible manuscripts on a large scale; in St Gall, Greek or Irish texts (*libri scottice scripti*) were cut up for pastedowns during the rebinding operation between 1436 and 1461; these fragments were salvaged by the librarians J.N. Hauntinger (1756–1823) and I. von Arx (1755–1833) and were bound up in eight volumes (SG Cod. 730, Cod. 1394 to Cod. 1399; see Scherrer 1875 pp. 236, 456ff). As a consequence of the Council of Trent (1545–63) many liturgical works lost their usefulness and were surrendered to binders. Yet their truly wholesale destruction set in with the Reformation in the sixteenth century: events like the Peasants' War in Germany (1525), the dissolution of English monasteries (1537–9) and the Huguenot wars in France (1561–89) resulted in cartloads of cheap 'binder's waste'. For further details on manuscript fragments in bindings see, for example, Ker (1954) and Watson (1977).
12. A good example of cut-out flyleaves is BL Add. 49.999 (De Brailes Hours), as evidenced by knife slashes. Contrary to the claims of Pollard (1962 p. 3, note 5) and Donovan (1991 pp. 30–1), this is not a contemporary English work but a second or third rebinding of Italian origin, probably from the fifteenth-century. Evidence (my autopsy of January 1992) are the severely butchered margins, the boards of beech, the characteristic Italian type of board attachment and the endband; the imprint of a textile structure in the covering leather (visible in fig. 8 in Donovan 1991) and remnants of brown silk indicate that it was a rebinding with a chemise. In 1906 Sidney Cockerell noted already that it was an Italian binding (see Pollard 1962 as above).
13. Most of these 50 manuscripts had reached St Gall at a later period already provided with a binding; they were donations or came from neighbouring monasteries that were closing down and they were unlikely to be the product of a single workshop.
14. I owe this information to Sister Lucie M. Gimbrère, OSB.
15. In a folio book the pin holes are in the centrefold; in a quarto or octavo they come to lay in the outer margins and are usually lost through the binder's knife. For early data on the use and construction of the points see, among others, Moxon (1683 4 p. 78 and pl. 9), McKerrow (1928 p. 22) and Gaskell (1972 p. 128); I am grateful to Kees Gnirrep for guidance to these references.
16. Marking up was also done with crayon or ink: Leiden UB Voss. Lat. Q.59, a seventeenth-century rebinding of a fourteenth-century manuscript, has its main stations marked with brown ink and the change-over stations with red paint (observations during restoration by Sister Lucie M. Gimbrère OSB).
17. SG God. 325, 796, 797, 799, 803 were written and bequeathed to the Library by the priest Matthias Bürer (1427–85); the mutually shared traits indicate their origin from the same workshop, probably in Southern Germany. SG Cod. 930, 1058 and 1077 are likely to originate from three other workshops.
18. Sister Lucie M. Gimbrère OSB kindly provided these data from her 25 years of restoration practice. From 372 bindings (mostly holdings of the University Libraries of Leiden, Nijmegen and Utrecht) 55 had single thongs; 14 are from the Carthusians, nine (including the earliest one from 1405) from the Canons Regular, both in Utrecht.
19. The false single bands on Italian renaissance bindings are usually decorated with oblique hatched lines, similarly to the often pronounced bands at the change-over stations. If the gilt oblique lines were traditionally associated with link-stitch chains, then double supports might have alternated with link-stitch sewing. This would fit the instruction for ledger bindings in the manual of Dudin (1772, pl. XIV, fig. 1) to alternate double cords with a *chainette* like those at the head and tail. However, having examined some 25 bindings with alternating single and double bands I have never encountered any sort of stitch underneath the false bands.
20. Modern binders often employ the two-on type of sewing in order to reduce excess swelling. De Bray (1658 p. 37) was indeed aware of this principle and recommended it for binding folio volumes of thin quires. However, later manuals mainly stress the aspect of the savings on labour and cost of thread.
21. The samples of sewing thread in Group B were taken from fragments saved during restoration of the bindings. In the first stage of the restoration project of the Zutphen Librije, which started in the early 1960s, over two dozen bindings were harshly treated, including complete resewing. Fortunately, this policy was soon changed, and an advisory committee saw to it that only inevitable interventions were undertaken to assure optimal conservation.

22. Archival evidence on the sewing thread is meagre. Laffitte (1989) quotes a 1367 inventory which mentions hemp: '*ligatus cum filo, cum quadam cordula canopis*' [Cannabis?] and another record of 1378, that specifies the origin '*pro filo de Bourgogne*' but not the material.
23. The binder's note on the lower pastedown of San Marino, Huntington Library HM 132 reads: 'In leddur hongre ii d; In whyte threde ii d; ii new bordes i d; ii skynys of parchment viii d; A skyn of redlather ii d; In blac sylke and greyne i d ob: In glw ob; ii claspys ii d; summa totalis xix d' (Dutschke 1989 vol. 1, p. 176); the specification of thread and of new boards clearly indicates that the book was rebound. Laffitte (1989) noted a late fourteenth-century reference in the accounts of the Carthusians of Champmol, mentioning a '*petite paelette à faire de la cole pour coller les cuirs sur les livres*'; this kind of vessel (a small bowl for blood-letting) and the proposed use (to attach leather) indicate that we are probably dealing with starch paste.
24. Brittleness upon drying is one of the characteristics of animal glues. They were one of the main types of adhesives in the Middle Ages, along with casein and vegetable adhesives derived from starch, gums and resins. Glue is made by extraction from collagen-containing animal tissues (bone, hide, cartilage, tendons or parchment or skin waste); according to Skans (1991), who has experimented with medieval recipes for glue and analysed the obtained products, the old glues were of top quality: they contained natural fats which acted as plasticizer and made the glue more flexible. Later, glue manufacturers removed all natural fats which yielded a product of inferior quality.
25. The early manuals of Faust (1612), de Bray (1658) and Zeidler (1708) do not mention the use of any hammer to round the spine, but from the illustration of de Bray (see Figure 9.10) and the description of Zeidler (pp. 75–80) it is evident that the book, with indeed the spine rounded, was put in the press in order to be glued up and provided with linings. Prediger (1741 vol. I, p. 34 ff.) employs the term '*Rucken*' both as noun ('back') and verb ('backing', 'to back'); the latter includes both giving the spine a rounded shape with the aid of a heavier hammer ('*mit einem etwas schwehren Hammers*') and forming the shoulders with a small hammer ('*mit einem Hämmerlein [. . .] rund geklopffet*'). In early workshop inventories no particular backing hammer is specified. The inventory of Bamberg St Michael Monastery from 1483 lists '*duo paria asserum ad dorsa librorum utensibilia*', which probably are pairs of backing boards; a later German version notes '*I esel zu ruckemachen in die bücher*' (Lehmann 1929-30), which could mean a standing press or press support for backing. Obvious evidence are the '6 payer of backyng bourds in folio' in the inventory of the Cambridge binder John Denys from about 1578 (Gray and Palmer 1915 p. 58) and the '*33 Einsetzbretter*' in the inventory of the Leipzig binder Christoph Birck from 1578 (Helwig 1941).
26. Gottlieb (1910 cols 17–18) studied the techniques of many Grolier bindings and suggested that the way the edges of the slotted linings were cut along the head and tail could have a geographical significance: those of a trapezoid shape would indicate French origin, those left straight were from Italy. Re-examining his material I found that some slotted linings with straight edge were sometimes made from reused parchment with French writing (for example, ÖNB 22.R.8 [now ES 182], an Aldine of 1534), which makes Italian origin unlikely.
27. Anshelmus Faust, the author of the 1612 binding manual, seems to have been a craftsman of doubtful standards. Rather than urge the binder to align his plough properly, he advises him to compensate the knife's deviation by applying more pressure on one of the plough's beams during the trimming stroke (Faust 1612 pp. 56–7).
28. In the anonymous commentary in Zeidler (1708 p. A 45), a binder from Halle, Johann Linck, is credited with the invention of the 'saddle'.
29. Although the polychrome edges of the Corvinian bindings – mostly bound in velvet – could be Hungarian work, painted edges, occasionally with gold, on luxurious medieval bindings were quite common all over Europe (Foot 1993).
30. The technique of edge gilding includes smoothing the edges – while tightly held in the press – applying a layer of adhesive medium such as size or egg-white, laying on the gold leaf, drying and burnishing with an animal tooth or stone burnisher. The earliest description I found is in a late fifteenth-century Middle Dutch treatise published by Braekman (1986): '*Neem scoen clarij ende legt dair mede ouer, ende dan sciet dat gout dair op te vuil dat nat is, dan laet drogen, ende dan bruneer ende ponsoneert. Ende op oude boken, so doet een luttel soffraene and en luttel bolus tot die clarii dair mede geweruen*' ['Take glair and put it on, and lay the gold while it is wet, then let dry, and burnish and gauffer. And on old books, add some little saffron and some little bole to that egg-white to ground with']. A more detailed description of edge gilding is provided in a treatise of Symon Andriessen (1552 f. 30v–31v); it adds an important detail, namely the placing of a board between the textblock and the covers in order to avoid befouling the leather ['*om dleer niet vuyl te maken*'], which proves that edge gilding was done after covering, a procedure rather strange to the modern binder who does it before. I have found evidence of this procedure in the form of traces of gold on the board edges and/or the primary endbands in

several instances, such as the chemise binding The Hague KB 135 J 55, and on various 'alla greca' bindings (see section 6.11). Bearman (1996b fig. 8) observed gold leaf and tiny marks of pointillé tools on the edges of the boards on the original binding PRO E. 33/16 proving that the edges were gilded and gauffered after the wooden boards had been attached. This particular procedure is not mentioned in later instructions for edge gilding, as in the appendix to de Bray's 1658 manual by Ambrosius Vermerck, dated 1667, and in Zeidler (1708 p. 97) and Prediger (1741 vol. 1, pp. 62ff.).

31. The latest census records 216 extant volumes from the Corvinian Library (Csapodi and Csapodi-Gárdonyi 1990). The description of the bindings is rather too brief, but the introduction 'The Library of King Matthias' (pp. 13–32) is an excellent summary of the heyday and the destruction of the library and its close connection with the Italian humanists.
32. Ignorant of Rhein's article, I initially accepted Jäckel's authority, until in 1985 I learned from Eva Csenki, then restorer at the Semmelweis Medical Museum in Budapest, that integral sewing is no rarity in their collections. Her meticulous analysis of the integral endband on an incunable from 1498 (Budapest Semmelweis Museum Inv. no. 116658/S 81), probably bound in Hungary, has proved that such endbands could indeed be worked very evenly (Csenki 1985; 1986).
33. Sister Lucie M. Gimbrère, OSB, kindly recorded for me the occurrence of saddle-stitch endbands on bindings that passed through her restoration workshop. Out of 440 bindings, saddle-stitch endbands were found in 113 cases (25 per cent); four belong to the fourteenth century (the earliest is dated 1374), 98 are from the fifteenth and 11 from the sixteenth centuries. Even if not all bindings have their origin ascertained, the bulk is likely to come from the Netherlands.
34. It is generally assumed that the art of intricate braiding with leather lacing had flourished in the hands of Arab leatherworkers in medieval Spain and that from here it was introduced into the New World with the horses and horse gear of Cortez in the sixteenth century (Grant 1972 p. xxi). Many variants of edge braiding of horse equipage in Grant's book are virtually identical to various braided endbands in bookbindings.
35. For the German binder, endbanding comprised two steps: first, gluing the endband lining of parchment onto the head and tail of the spine, called *capitalen* (defined as a *terminus technicus* by Prediger 1753 vol. 4, p. 31), and second, *bestechen*, which meant adding an embroidered endband sewing, including tying down the thread; both operations were the subject of guild regulations. The imitation of the primary embroidery along the edge of the lining was an obvious bending of the rules: Adam (1911c) found such 'stuck-on endbands' '*eine ins lächerliche gezogene Erfüllung der Zunftvorschrift*' [a ridiculous fulfilment of the guild rules].
36. The story of walnut boards seems to go back to a treatise by Benziger (1912 p. 186) on the history of the printing office in the Benedictine abbey of Einsiedeln, Switzerland. According to accounts covering the period of 1652 to 1798, local carpenters and coopers had acted as '*brettlimacher*' ['board makers'] and supplied wooden boards to the bindery; '*Sie schnitten diese aus Hartholz, meistens verwendeten sie Nussbaumholz dafür, das Hundert in 8° wurde ihnen mit 3 Pfd. 7 S, das in 12° mit 2 Pfd. 5 S vergütet*'. These were used on small devotional works from the seventeenth and eighteenth centuries (Benziger pp. 254–86) and not on late medieval gothic bindings. Yet it seems to be this source to which Helwig (1961–5 vol. 1, p. 56 and 1970 p. 29) refers, stating that '*im frühen Mittelalter verwendete man sehr dicke Holzdeckel, meist aus Nussbaumholz*', misleadingly quoted by many later authors.
37. De Bray's (1658 p. 30) reads: '*en schraeptet dan met een Eijzer*' [and scrape it then with an iron]; the editor's reference to fig. *oo* on p. 46 is incorrect – the instrument shown there is a creaser to draw blind lines for decoration.
38. The toughness of earlier leathers has often been noted. D. Cockerell (1929 p. 47) thought that fifteenth-century calf was made from older animals and hence had 'some qualities of hide'; only later would younger animals be used. Middleton (1963 pp. 188 ff.) refers to nineteenth-century manuals where soaking in water and beating are recommended, for Russia calf among others. It would seem that earlier tanning and finishing ('currying') procedures had left the binders with less pliable materials than those of modern times.
39. The confusion in German literature started by the introduction of the ambiguous term '*Buchbeutel*' ('pouch to contain a book'), used by the early authors like Adam (1890), Loubier (1904; 1926) and Glauning (1926), but alternating it with '*Beutelbuch*' ('pouch book'); Loubier (1917; 1924) made things worse by introducing the term '*Hülleneinband*' for what in fact is a classical proper girdle book with loose ends (Gothenburg Röhsska Konstsslöjdmuseet Inv. no. 519–15), but applying it also to bindings with a textile chemise or a leather overcover. The terminological chaos is partly due to lack of structural analysis of the objects concerned: in the old days a drawing, a brief description or a few photographs, sent by a friendly librarian, was considered to be a sufficient basis for a publication. This was the case with the first so-called '*Hülleneinband*' (in fact, the Gothenburg girdle book) of Loubier (1924), published on the basis of photographs: '*durch das freundliche*

Entgegenkommen des Direktors [. . .] *im Museum angefertigten vorzüglichen Aufnahmen*'; Glauning (1926) was in error in proclaiming the Düsseldorf girdle book (Düsseldorf KM Inv. no. 8309) to be a fake solely on account of the curator's written statement. For a discussion of the still unresolved German terminology see Schreiber (1939a; 1939b; 1940), Rhein (1960), Szirmai (1988a) and U. Bruckner (1997). The English term 'girdle book' was first used by Küp (1939), who also spoke of 'pouch binding'. In fact, the latter term would have been a better choice, since 'girdle book' had earlier been used for precious miniature books ('bokes of gold'), hanging on golden chains or on the girdles of ladies of nobility in the sixteenth and seventeenth centuries (Prideaux 1893 p. 187; Brassington 1894 pp. 218–19; Plomer 1902–4 p. 11; Davenport 1907 pp. 159–60; and Tait 1991 pp. 113–14); for this latter category the term 'pendant binding' suggested by Blumenthal (1963) would be more appropriate.

40. The Bible came into the possession of Duke Jean de Berry and is described in the inventories of 1402 and 1416. The latter reads: '*Item une belle Bible en latin escripte de lettre boulonnoise, qui fu du roy Robert, jadis roy de Sicile, très bien historiée et enluminée d'ouvraige romain; et au commancement du second fueillet a escript: one usque ad Egiptum; couverte de cuir rouge empraint, à iiii fermouers d'argent dorez, esmaillez aux armes de Monseigneur, et par dessus une chemise de drap de damas bleu, doublé de tiercelin vermeil; laquelle Monsigneur d'Oréans donna à Monseigneur le xviii jour d'aust l'an mil CCC et VII*' (Avril 1969). I owe this reference to Dr C. Coppens. According to my autopsy in March 1991, the volume's latest rebinding dates to the late nineteenth century; it is made of pigskin with a rounded spine that causes serious damage to script and illumination each time the manuscript is opened.
41. Unfortunately, Oppitz (1995) also includes among the 131 representations 22 overcovers, adding to the existing confusion; the continuous numbering, at present 813 as given by Merkl (1997), is therefore incorrect and also outdated, since nine more cases were added by U. Bruckner (1997). The count also disregards the *c.* 25 Scandinavian examples listed by Starcke (1949). I know of several instances in Hungarian, Italian and English sources, which so far have not been documented systematically.
42. The Toruń example is one of the two precious girdle books bound in velvet which had belonged to the 'Silver Library' of Duke Albert of Prussia (1490–1568) or rather to his second wife Dorothy. They have gilt and gauffered edges and furnishings of silver; they are the only girdle books with a Protestant content (Psalms in Luther's translation), indicating that although the religious belief had changed, the traditional book shape had not. The second example (U. Bruckner 1995 no. 27) vanished after its evacuation from Königsberg during World War II (Tondel 1987).
43. The Wistrand girdle book was sold at Sotheby's in London in June 1997 and is now owned by a private collector in Germany (information kindly provided by Dr Christopher De Hamel; his letter of 25 June 1997).
44. This binding was kindly drawn to my attention by Mr J.-P. Spetzler.
45. It was assumed that this 'girdle book' enclosed a panel-stamped binding of 'The Myrroure of Oure Lady' of 1530 (Nixon 1978 no. 9); however, the dimensions of this bookblock are too large to fit in the empty overcover. It should also be noted that this would be another example of a decorated binding later made into a girdle book.
46. In 1578 Amsterdam became Protestant, and the properties of the Catholic churches and monasteries were confiscated. Their libraries, among them that of the Nieuwe Kerk, were screened and the majority destined to become part of a chained public library; in 1632 the library was moved to the *Athenaeum Illustre*, the future University of Amsterdam, thus escaping the fire of the Nieuwe Kerk in 1645, which unfortunately destroyed all archival material. However, we are fortunate to be in the possession of archival documents of the chained library of the University of Leiden, founded in 1575; in accounts covering the years 1581 to 1596 one encounters entries of payments to the binder such as '*in root leer met seems leer op de rugge*' ['in red leather with chamois leather over the back'] and '*gebonden in bresyloot mit copere sloten en beslach, den rugge met zeems leer betrokken*' ['bound in brazil with copper fastenings and furnishings, the back covered with chamois leather'] (Witkam 1970 vol. 1 pp. 110–14), providing evidence that the overback was part of a newly bound library binding.
47. In the accounts of the Zutphen St Walburga Church from 1575 a purchase is mentioned of a Hebrew bible, which was covered with chamois leather ('*met seemsleder omtagen*') and chained by a Father Simon (Meinsma 1902 p. 232); this binding is probably identical with Libr. M 753, a blind-tooled binding decorated with, among others, a portrait roll dated 1539. In the 1442 accounts of the St Bavo Church of Haarlem a similar term is recorded in a payment for 'a small skin to cover a book' ('*om een clen vel om een boec bethugen*' (Wüstefeld 1989 p. 104). The Middle Dutch verbs *omtagen, omtiegen, ommetien* or *betien* have meanings like to cover, surround, enwrap, envelop, dress or to clothe.
48. Laffitte (1989) quotes '*corio morello sculpto cum liliis et diversibus animalium*' (Visconti-Sforza inventory of 1426)

as a possible equivalent of cuir-ciselé next to others like '*escorchié*' or '*cuir entaillé*', admitting the ambiguity; she also found '*bulitus*', '*coctus*' or '*bouilli*', again difficult to interpret. Even more difficult is to understand the confusion about the terms cuir-ciselé and cuir-bouilli, apparently going back to the Middle Ages. The latter method was applied to the making of leather objects like caskets or containers on removable moulds; the process is based on the irreversible contraction of the mesh of the skin fibres, when the 'shrinkage temperature' of the collagen protein is exceeded, which happens when heated to 80°–100° C. Hardening in the contracted state was facilitated by previous impregnation with wax, resin or adhesives (see also Waterer 1946 p. 42; Middleton 1963 p. 167). The grounds for the confusion is probably that these leather objects often are decorated with cuir-ciselé techniques, such as '*un estoy de cuir boully, poinçoné* [. . .]' in an account of 1387 (Gay (1887 p. 516). It is hard to imagine how book covers could have been 'boiled' and it is regrettable that the ambiguity is propagated in recent scholarly works (A. Hobson 1989 p. 114, fig. 92: 'decorated in *cuir ciselé* and *cuir bouilli* techniques', neither of which seems to hold).

49. Having briefly examined this binding, I share the opinions of those who doubt the early dating of this panel (see Fogelmark 1990 p. 68).
50. Blind tooling with short-tang tools that had to be hammered into the leather was probably also practised in the Western world. Evidence is presented by one of the tools described by Hobson (G.D. 1939 pl. vii, no 5), with blunt end with hammermarks; still, he wrongly dismissed it, assuming that it 'cannot, therefore, have been a binder's tool, since bindings are tooled by hand-pressure'. But there is more evidence for hammering: Oldham (1958 p. 1) mentions an extant tool (Oriel College, Oxford) 'with shank with a flat top to be impressed by hammer'; the Amsterdam firm which specialized in printing and binding Bibles has preserved several such tools from the eighteenth century, in both iron and brass (*Twee eeuwen Brandt en Proost*, Amsterdam, Brandt and Proost 1942 pp. 162–82, fig. opposite p. 166).
51. The binder ascertains the right temperature of his tool by listening to the sound it produces when tested on a wet sponge: hissing means that 100° C has been reached and cooling the tool a little is the correct way to avoid scorching the leather.
52. There seems to be little documentary evidence as to the technical methods of gilding. The expression '*impressi in oro*' does not occur in the original Naples documents (referred to by Gottlieb 1910) as rightly pointed out by Miner (1957 p. 89) and by A. Hobson (1989 p. 57, n. 80) – here Gottlieb was misinformed. Terms like '*coreo impresso*', '*intextum variisque sculptum sigilis*' and '*eleganter stampito*' do not distinguish between tooling in blind or gilt; the expression 'alla fiorentine' probably refers to 'punch-gilt roundels' and '*stampato à la damaschina*' to tooling with (heated) stamps. For variants of such expressions see, for example, Delisle (1907), De Marinis (1960) and Laffitte (1989).
53. In his twelfth-century treatise Theophilus (1979 p. 31) advises: 'if you do not have gold, you may use tin leaf', and describes its preparation, colouring and application with gluten varnish; for a detailed account on 'golden tin' see Cennini's '*Il Libro dell' Arte*' (Thompson 1933 pp. 61ff.).
54. The tools used for gilding straight lines of various lengths are known as pallets, those for segments of a circle are gouges; fillets are brass wheels set in a wooden handle, required for longer single or multiple lines, whereas the roll is a brass wheel provided with ornaments.
55. The Tegernsee manuscript (BSB Cgm 821) contains in the still unpublished part of the text, on folios 229^{r} to 230^{v}, details of various gilding methods for bookbinders (Schneider 1984 p. 470). From the transcription, kindly provided by Prof. J.P. Gumbert, it appears that 'wet gilding' is described in some detail; a closer analysis of this text is forthcoming.
56. My examination of Bodley Bodl. 523 has confirmed that the gilt areas indeed show the structure of wood; this does not mean that the actual blocking had been done with wooden panels – it could have been a metal cliché (see also Fogelmark 1990 pp. 124 and 193). In fact, the fairly uniform imprint suggests that the binder owned two sets of each panel, which allowed him to press each cover in a single operation.
57. Archival evidence indicates that the two kinds of tools were clearly distinguished: the inventory of the court bindery in Heidelberg from about 1500 lists '*ain goldtroll mit kautzen und vögln*' and '*ain lederroll mit rinden köpffen*' – the latter (the 'leather roll') evidently intended for blind tooling (Koch 1889). Various sources mention tools specifically intended for gilding: the 1537 inventory of the widow of the Paris binder Pierre Roffet lists '*plusieur patits fers, une presee d'imprimerie garnie de sa barre, et treize platines tant petites que grandes, montées sur plomb ou bois, le tout servant à dorer le cuir*'; Kirchhoff (1889) cites from the 1592 inventory of the Leipzig binder Andreas Ficker '*goldstöcklein, goldt Rolle, sieben Kleine vorgultt Rölgen*'. In England early experiments with gold tooling were carried out using panels and rolls cut for use in blind (Nixon and Foot 1992, pp. 25ff).
58. The design of such panels seems to have been taken from contemporary pattern books, like Pellegrino's '*La*

fleur de [. . .] *pourfraicture et patrons* [. . .]' (Paris 1530) or Flötner's *Kunstbuch* (Zurich 1549). Schunke 1954; 1959) found two versions of a panel copied from Flötner on four bindings from Tübingen and Augsburg; I noted three more variants of the same design (Mazal 1970a no. 155; Mittler 1986 no. F.1.4 and Piquard 1951 fig. 8), all on works of Cyprianus Leoviticus, printed in Augsburg in the 1550s, possibly publisher's bindings (see also Szirmai 1981–2 for further references).

59. The white calf binding, which De Marinis (1964) describes as '*non è impressa in oro, ma in nero*', covers *Cento giuochi liberali d'ingegno* of Vincenzo Ringhieri, a Bologna imprint of 1552. On another white calf binding of the same work and decorated with the same black panel (Amsterdam UB Ba 1 C 15) I found tiny metal traces suggesting that the original blocking had been done with metal (silver?) foil.
60. The designation *Gürtler* (girdler) refers to craftsmen who manufactured belts and the required metal accessories such as buckles; earlier, the production of armour and cuirasses fell into their realm, later they made objects for everyday use of leather and/or of metal, mainly brass, furnishings for bookbindings, etc. Where the demand of the market was large enough, the craft of *Clausurmacher* was able to emerge, as for example, in Nuremberg, Erfurt, Leipzig and Wittenberg; we learn from a 1567 request by the binders to the municipal council of Augsburg that, due to the death of a Nuremberg *Clausurmacher* and the high prices the local *Gürtler* demanded, they asked permission for a Heinrich from Erfurt to establish himself as a *Clausurmacher* (Bücher 1897 pp. 345–6; Helwig 1962 vol. 1, p. 55). The occupation was known elsewhere too: in Paris, Mahiet Révérend is mentioned as *faiseur de fermoirs de livres* in 1545 and so is Mathurin Regnier in 1553 (Renouard 1901 p. 234). But binders also made metal furnishings themselves, as is evident from inventories where metal-working tools are listed; the earliest is that of the Bamberg monastery, dating from 1483 (Lehmann 1929 30; Helwig 1941).
61. Engraved inscriptions of the owner's name have been reported on many bindings from Lübeck and Rostock (Altmann 1972, citing also the earlier literature). She observed that the 'ex libris' fastenings are of the type with 'feathered' tail (as shown in Figure 9.50[a]) and considered them as characteristic for Northern Germany. Since then it has become clear that such 'feathered' fastenings were also quite common in the Low Countries and in the Rhineland and Westphalia.
62. The term 'Nuremberg wares' is widely used to denote metal fastenings and furnishings, yet so far on rather uncertain grounds. We must admit that our knowledge of the manufacture of metal articles for everyday use in the late Middle Ages is very imperfect; we know little of the organiztion of the various crafts and their areas of specialization; we are largely ignorant of their working methods: what was truly 'hand-made', which tools or machinery did they employ to facilitate efficient production, and, above all, what trade channels were used for their distribution. Although there is plenty of evidence that Nuremberg was a prominent site of metal craft, including goldsmithing (see Kohlhaussen 1968), there is no specific record of the production and trade of book furnishings – an area urgently in need of further research.
63. On two Corvinian bindings (ONB Cod. 140 and Cod. 218) I found that the roll of the recessed catch plate is completely hidden under the covering, so that originally the now-lost hook of the clasp must have closed over the leather.
64. I owe thanks to Kees Gnirrep for drawing my attention to several variants of such signed furnishings, probably of Dutch and possibly of Amsterdam origin.
65. The clips for attaching the chains were cut from metal (copper) in the bindery, as is evident from an account from Eton College, dated 1520: '*et pro fari farcipum ad laminas enas secandas ad fixturam librorum xvj d.*' (Streeter 1931, pp. 96–7). But Sir Thomas Bodley had them bought ready-made as he informed his librarian: 'having sent yow nowe by the cariar [from London] 500 clippes, [. . .] 'and withal towards 5II weight of wire', the latter obviously for making chains (id. p. 201). The library seems to have owned even a 'Wyerdrawer' for this purpose (id. p. 237).
66. This seems to apply to the chained library of Leiden University, established in the late 1580s; the only volume with the original chain preserved (Leiden UB BPG 37) has its clip attached close to the back at the top edge of the lower cover; its title on the back is upside-down. Witkam (1970 vol. 1, p. 82) suggests that the chain (c. 210 mm) was just long enough to allow the books, stored on the shelves upside-down with their backs outwards to be taken on to the standing lectern below; this disagrees with the well-known print of Woudanus from 1610 (reproduced in Clark 1902, fig. 70; Loubier 1926 fig. 82), showing the books with the fore-edge in view.
67. Information kindly provided by Kees Gnirrep.
68. In the first description by Franck (1941; 1949) the arch sewing was interpreted chiefly as a means of providing a soft opening arch; I proposed as another aim the maintenance of the rounding of the spine, analogous with the rib of a vault (Szirmai 1990 1).

69. At the completion of the rebinding operation at St Gall Abbey in 1461 a catalogue was made (partly preserved as SG Cod. 1399; see also note 7). The same hand wrote the title labels on the upper covers, and the shelf-mark labels (large red capital and small number) on the back. I have found, when studying the collection between 1989 and 1992, at least 20 instances of intact back labels; they all are positioned to be read when the book is lying on its side, indicating that the books were kept horizontally.

Chapter 10 Limp bindings

10.1 INTRODUCTION

Whereas the majority of medieval bindings used stiff wooden boards, there was also a variety designated in medieval catalogues as *libri sine asseribus, sine postibus, in quaterno* or *in pergameno*. The meaning of such terms is not always clear: *in quaterno* or *in quaternis* could have referred to unbound quires in the same way as *non ligatus* was used; *coopertorium* (hence the German *Kopert*) seems to have had become a generic term for a certain type of parchment binding (see below), but the word was also employed to describe the covering of wooden-board bindings (for further details on the interpretation of these terms see Schmidt [1960], Robinson [1980], Ker [1985 pp. 306, 358] and Laffitte [1989]).

Data on the relative frequency of limp bindings are scant. Gasnault (1980) found in the 1369 inventory of the Avignon Pontifical Library 40 out of 2059 books described as *sine postibus*, amounting to two per cent. Schmidt (1960) collected some figures in German inventories: Erfurt University possessed at its foundation in 1407 a library of 181 volumes, 16 of them being limp bindings (8.8 per cent); the Amplonian Collection of 866 manuscripts, donated to Erfurt University a decade later, held 192 limp bindings (22 per cent); according to a catalogue of 1461 the Dominican Convent in Nuremberg had a library of 352 volumes, 32 of which were limp bindings (9 per cent) but there were also a further 113 books privately owned by various nuns, 50 of them in limp bindings (44 per cent). Even aristocratic libraries contained simple limp bindings: the library of Borso d'Este in Ferrara, according to its 1467 inventory, included out of 175 volumes 14 *sine tabulis* which amounts to 8 per cent (De Marinis 1960 vol. 2 pp. 35ff.). Similarly, the inventory of the libraries of Charles V and Charles VI (1364–1422; see Delisle 1907 vol. 2), abounding in sumptuous bindings of various textiles, with chemises and fastenings of precious metals and jewellery, names its Cinderellas: out of 1239 volumes 116 (9.4 per cent) were described in unambiguous terms as '*couverte de parchemin*' or '*de parchemin escript, couverte de cuir sanz ais* or *d'un pel de parchemin*'. In the sixteenth century the frequency of limp bindings seems to have increased: the library of the Amsterdam priest Jacob Buyk (1545–99) claimed 192 limp bindings (22 per cent) out of a total of 864 volumes (Buyk Collection in Amsterdam UB);[1] in the Ramey Collection (PML), representing a sixteenth-century French private library, limp bindings exceed 50 per cent (Pickwoad 1995 fig. 3).

Limp bindings have received little attention, mainly because they lack decoration which was usually the exclusive interest of students of bookbinding in the past. Although the kind with rigid back plates (see section 10.4) have been described in some detail early this century (Adam 1910a), scholars have neglected them deploring their inferior decora-

tion: '*Die künstlerische Verzierung tritt nur in einfacher Form hinzu*' (Eichler 1923). Schmidt (1960) castigated his predecessors, blaming them for regarding the exposed sewing on the back as decoration and not recognizing its functional aspects, a misconception which greatly impeded the understanding of the structure of limp bindings.

Christ (1937) was the first to describe the earliest and entirely undecorated limp bindings dating from the Carolingian era; he lists a dozen of them (10 from Fulda, kept in Kassel GHB and Basle UB), but unfortunately since then much evidence has been whittled away due to harsh repairs.[2] Van Regemorter (1957) re-examined nine Basle limp bindings originating from Fulda. As she failed to recognize that most of the bindings had lost their original sewing due to later interventions and her descriptions are very sketchy and deficient, van Regemorter has left us with more questions than answers. Later careful examination of the centrefolds has revealed redundant sewing holes which proves that many of these limp bindings are not contemporaneous with their contents (Marshall 1993).

Another past misconception was to consider limp bindings as temporary and inferior and work of incompetent laymen. This might apply to simple wrappings used for keeping a few quires together before final binding or for preserving loose archival records, but certainly not to many limp bindings of a rather sophisticated structure that testify to a high standard of workmanship. Their great diversity is reflected in this chapter, which – in contrast to the preceding ones – covers a number of different typological entities with the common trait of a limp or semi-limp covering. Admittedly, the judgement of the quality of this feature is arbitrary: laminating a leather or parchment cover with a single sheet of paper leaves it flexible, but pasting 20 leaves together yields a stiff pasteboard cover which calls for a different categorization.

A systematic classification of limp bindings is by no means a straightforward matter. At first glance, the mode of attachment of the bookblock to the covering seems to be a useful gauge; however, it overlaps with other characteristics, such as the sewing, the material of the covering, the use of adhesives and the presence or absence of exterior supports.[3] Objects with analogous structures but a markedly different chronology do not make a homogeneous group, and the scarcity of data often prevents a distinction between exceptional and standard work. The following account is hardly more than sampling from a ragbag of an astonishing diversity of binding structures, which are found in the meagre literature and have been observed in my own study of about 120 limp bindings.[4]

The sample of my own research is admittedly too small to allow for any statistical evaluation except for one or two instances; moreover, it is biased, since the majority of the material originates from the Low Countries and comprises library books; hence limp bindings that were so ubiquitous in archives receive too little consideration. Consequently, many important types have certainly escaped attention; others like the vade-mecum were left out as having gone beyond the scope of this account.[5] Finally, it should be emphasized that even though certain limp binding structures remained in use far beyond 1600, their later evolution, with only a few exceptions, is not considered here.

10.2 BOOKBLOCK ATTACHMENT BY PRIMARY TACKETING

Tacketing appears to be one of the most ancient methods for joining the leaves of a quire or attaching them to the covering material: it was the basic construction of the very first single-quire codex (see the Nag Hammadi codices, Figures 1.2 and 1.3). We meet it again both in the Byzantine and Western binding traditions as 'quire tacketing', the temporary joining of the leaves of a quire before they reach the binder (see section 7.4, Figure 7.15; sections 8.3 and 9.4). Tackets usually consist of loosely rolled parchment strips but may be made of leather lacing or thread; the two ends usually pass from the centrefold through two holes and are knotted but more often twisted together; twisting may be on the inside or outside a quire. Tackets of sufficient length can be used for joining two or three quires, representing the simplest possible binding structure.

An early example of the use of tackets occurs in one of the Fulda limp bindings, namely Basle UB MS F.V.37, which seems to have been written in the second half of the tenth century. The volume contains five quires (188 x 150 mm) with texts of Isidorus; its title 'Planctus Isidori' in a fifteenth-century hand is written on the upper cover (Figure 10.1). The back of the limp parchment covering shows knotted tackets of thick parchment (?) strips and two different exterior supports, one a piece of thick, white chamois leather at the head and another of folded parchment at the tail. Closer examination has revealed that two different methods of tacketing were used at the head and a third one at the tail (Figure 10.2). There are several redundant holes in the centrefolds at the head region, none at the tail.

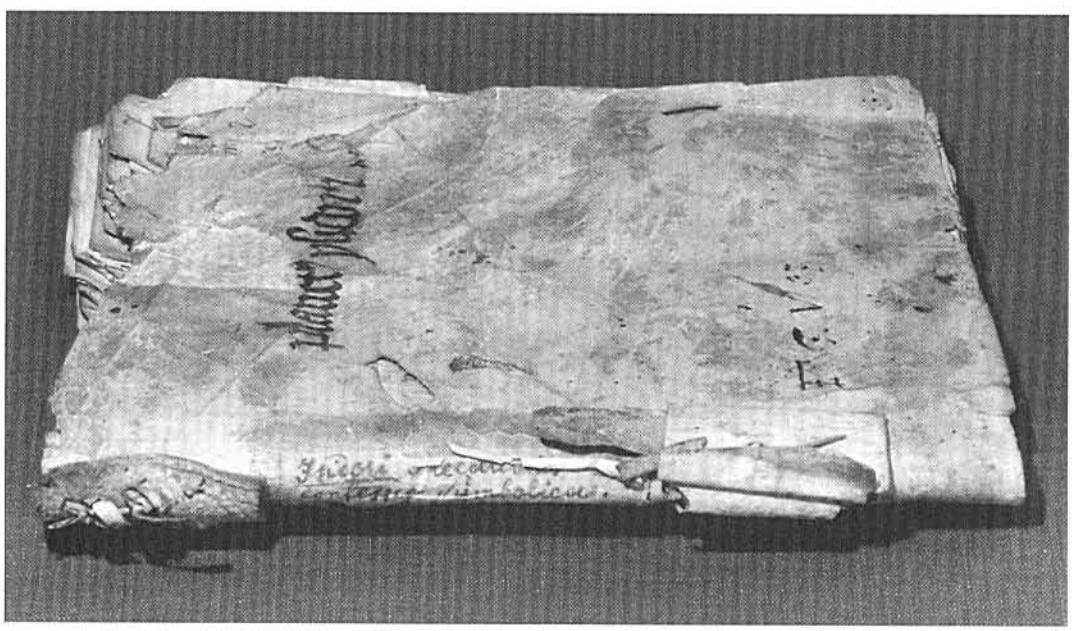


Figure 10.1 Limp parchment binding with tacketing onto exterior supports (Basle UB MS F.V.37, s. x, 182 × 132 mm).

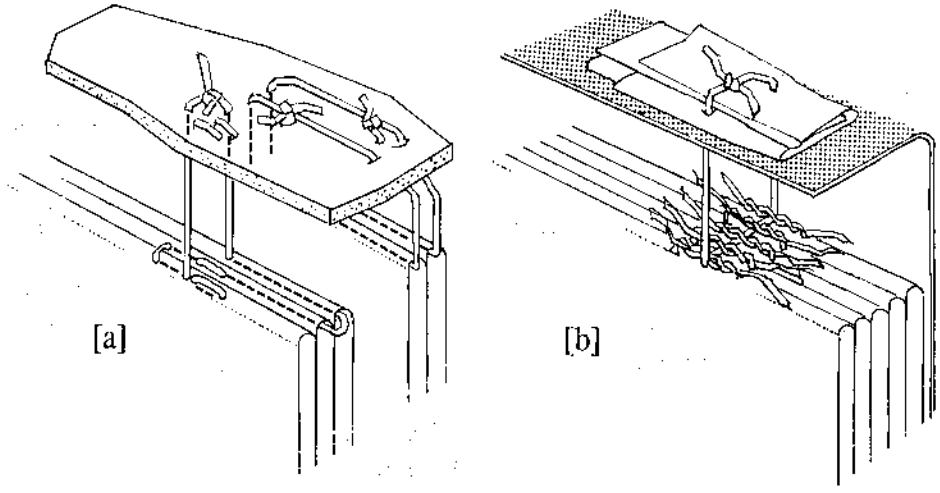
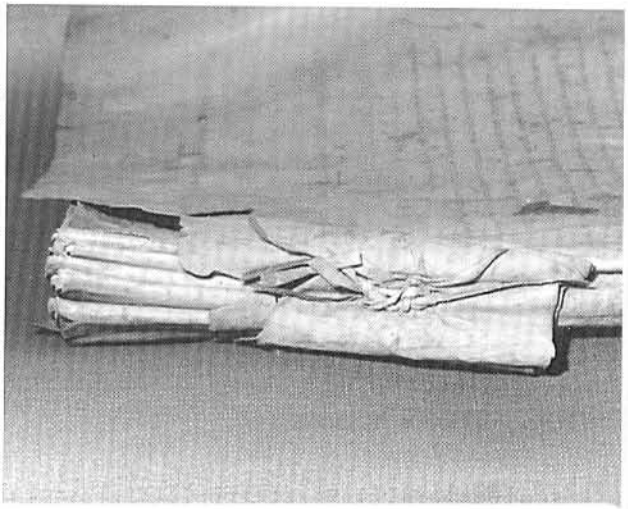


Figure 10.2 Details of the construction of the parchment covering of Basle UB MS F.V.37 (shown in Figure 10.1): [a], exterior support at the head, the first three quires attached with a single piece of lacing with several stitches, the last two quires with primary tacketing (cover omitted); [b], folded parchment support at the tail, all five quires show primary quire tackets, attached to the covering by a single secondary tacket.

It is doubtful that the binding structure is entirely original, as it is unlikely that a binder would use two different materials for the exterior supports, and apply a simple tacketing method at the tail but a more complex and rather unconventional or even muddled one at the head. Not least because of those redundant holes at the head of the quires should we regard van Regemorter's statement (1957) that this volume is '*absolument intact*' with reservations.

The proposition that the tail tackets of the above volume represent the original structure is supported by evidence of a similar limp binding in the same collection. Basle UB MS F.V.17 is a Martianus Capella written in the tenth century, probably in the Lake Constance area. It consists of five quires which, over an exterior support of folded parchment, are individually tacketed (with neatly twisted parchment tackets) on two stations *c.* 60 mm from either edge of two pierced holes spaced *c.* 10 mm apart (Figure 10.3). As there are no redundant holes detectable and the writing on the covering predates the manuscript, the structure is possibly original and contemporary with the manuscript.[6] Contrary to van Regemorter's firm conviction (1957), the construction of Basle UB MS F.III.15e is unlikely to be original, since it is tacketed into a probably fourteenth/fifteenth-century blind-tooled covering which is patched together from various reused brown leathers.

The above examples show that tacketing as a means of constructing a simple codex with a limp covering was a practice known to the Western binder at least as early as the tenth century. It might have been the method of choice for securing 'booklets', small single works of a few quires circulating as such or waiting to be bound in a larger volume (Robinson 1980).[7] The fact that such tacketed vellum wrappers are scarcely mentioned in the literature does not necessarily prove that their application was rare, but may reflect a



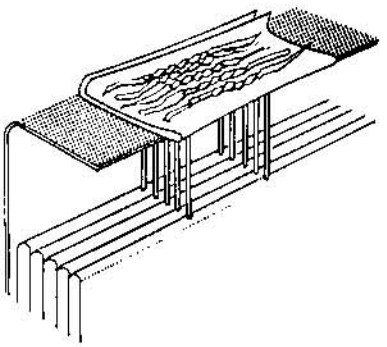


Figure 10.3 Parchment covering showing primary tacketing at the head, through a double-folded exterior support (Basle UB MS F.V.17, s. x, 355 × 260 mm); diagram at the right shows the structure exposed.

certain lack of interest in them; often they are only mentioned in passing, like Durham CL MS A.IV.34 (Doyle 1972) or Oxford Corpus Christi College MS 220 (Robinson 1980). According to Ker (1985 p. 358) 'the very common word *quaternus* means as a rule a book bound in a limp parchment cover' and 'the number of quires can easily be seen by counting the strings' [on the back]; he gives Oxford Lincoln College MS 62 as an example without emphasizing its rarity. D.-E. Petersen (1975 p. 69, pl. XXXVI) presents such a binding on a literary text by Wyclif (HAB Cod. Guelf. 1126 Helmst., s.14/15); my observations are made on similar though slightly later bindings from the fifteenth and sixteenth centuries (for example Amsterdam UB XXIII A 8, Leiden UB Cod. Vulc. 66, Zutphen GA Arch. Oude en Nieuwe Gasthuis no. 150).

The Zutphen manuscript is not a library book but an archival record, containing accounts of a Zutphen infirmary dating from between 1536 and 1550. This most basic binding structure was thought especially suitable for collecting records consecutively over a certain period of time: the two exterior supports of thick brown leather were long enough to hold a certain number of quires. However, the fact that each yearly account is wrapped into a leaf of the same liturgical manuscript would indicate that in this case the tacketing was done at the same time, even if three more sets of holes had been already made in the supports to receive accounts for another three years (Figure 10.4). The volume has no covering and no evidence that it ever had one and is thus a true example of an 'open-backed' binding (see section 10.5). Yet the possibility cannot be ruled out that there were intentions to provide a covering at a later stage.

Studies of binding structures in archives are very scarce, but they all mention primary tacketing. A very early example of tackets passing through a covering and an exterior support is a Royal Household account book dating from 1306 (London PRO E. 101/369/11; see Gullick 1996). A limp parchment covering of a slightly later early English

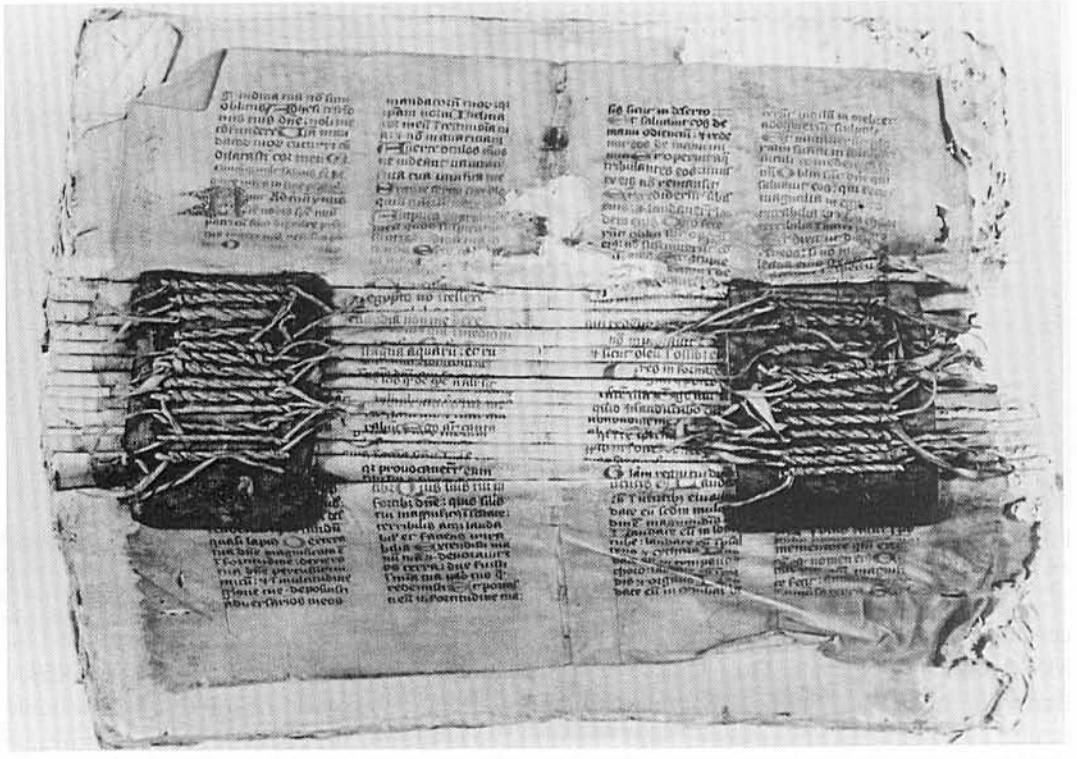


Figure 10.4 Primary quire tacketing to two exterior supports of 14 successive yearly accounts (Zutphen GA, Arch. Oude en Nieuwe Gasthuis no. 150, 1536–50, 290 × 105 × 60 mm); (from Geurts 1981).

account book (1312) was attached to its only quire with two parchment tackets (London PRO E. 101/14/22).[8] Another example is a limp parchment binding of the land register of the years 1316 to 1325, which as the only archival volume had escaped the fatal fire of the Castle of Prague in 1541 (Prague Národní muzeum HS VIII B 14; see Burdová 1990).[9] Fink (1939), reporting on archival bindings of the City of Lübeck, described an early example (containing legal documents of 1320 and the following 200 years) of a limp leather binding with a front-edge flap and a back, which obviously had received in advance the holes for all the quires that were supposed to be eventually included in the volume; further similar structures described in Fink's report are of a later date, mainly from the sixteenth and seventeenth centuries. De Valk (1990) carried out a survey of parchment bindings in the Amsterdam Municipal Archives; out of a total of 1193 bindings with limp- or stiff-board covers and dating from between 1531 and 1813, 114 bindings (9.6 per cent) have parchment tackets of various constructions.

Only a single instance has become known where flat wooden sticks, which are placed across the spine of the bookblock, are enclosed in the primary tacketing (with strips of pigskin) to reinforce the limp binding structure (account book of a Lübeck hospital from 1516; see Wiese 1981 p. 12).

10.3 BOOKBLOCK ATTACHMENT BY PRIMARY SEWING

There is a wide range of limp binding structures where the cover attachment had been carried out simultaneously with the sewing of the bookblock; 13 of the earliest limp parchment or leather bindings with primary sewing, which date from the tenth to the twelfth or thirteenth centuries, are listed in Table 10.1. Looking primarily at the sewing and secondarily at the nature of the covering material these examples fall into two groups; it is noteworthy that all three bindings of the first group seem to originate from the Carolingian era (and thus are the earliest of the examples chosen) and that parchment seems to have been the prevailing covering material of the earlier bindings and leather of the later ones.

The first three bindings in Table 10.1 show a cover attachment by link–stitch sewing. On Würzburg UB Mp.th.f. 150 (Figure 10.5) the number of chain links cannot be determined since the sewing has evidently been repaired. The sewing thread is laced in through the parchment covers in a V-shaped lacing path (familiar to us as the carolingian attachment of Type I, see section 7.3, Figure 7.6). The single-ply thread (8z-S) measures *c.* 0.8 mm in diameter. There are some redundant sewing holes (Figure 10.6[a]), possibly evidence of quire tacketing but more probably of an earlier sewing; the spacing of the sewing holes is suggestive of paired stations, hence the possibility cannot be excluded that the present sewing made use of the holes of an earlier link-stitch sewing. The parchment covering (0.8–1.2 mm thick), being stiff and brittle, is probably calf but certainly not '*Schweinspergament*' as stated by Thurn (1984 p. 77).

Uncertainties about the originality of the sewing apply also to the second binding, namely Kassel GHB Th.f. 65, of the first group of Table 10.1. Redundant sewing holes divulge that this sixth-century Italian manuscript has been rebound several times (Figure 10.6[b]). The original link-stitch sewing was probably carried out on paired stations; quire tackets are preserved at the head and tail of the back, with holes *c.* 10 mm apart (Marshall 1993 p. 239). The back shows three rows of 19 link stitches each (corresponding to the number of quires); there is no visible anchoring in the covers. At first sight, it appears remarkable that the three chains over the back have an identical number of links: if it is a simple three-station link-stitch sewing, then the number of links at the change-over stations should be only half of those at the intermediate station (see Figure 2.1[e]). Models of Würzburg UB Mp.th.f. 150 and Kassel GHB Th.f. 65 have made it plain that the extra links can be produced by returning the needle between the spine and covering to a previous hole (that is, adding an extra 'embroidered' chain stitch). But however sophisticated the sewing of Kassel GHB Th.f. 65 might be, it is out of the question that it is the first and original one.

The third limp binding with link-stitch sewing included here is Bodley Marshall 19, described and illustrated by Vezin (1982). The covering of the relatively thin manuscript of six quires shows on the back five unequally spaced link chains with five link stitches each; the chains of the two change-over stations are hidden underneath the thick chamois leather covering (*c.* 2 mm). The lower cover extends into a rectangular front-edge flap which originally had three ties of thin cord to close around buttons on the upper cover (now lost). Another feature reminiscent of carolingian bindings is the square leather tab protruding at

Table 10.1 Limp parchment bindings and limp leather bindings attached by primary sewing

No. Owner/shelfmark	*Contents*	*Date*	*Orig*	*Dimension*	*Quires*	*Sewing*[1]	*Covering*	*Lining*	*Edging*	*Flap*	*Fast*	*Ref.*[2]
1 Würzburg UB Mpthf 150	Gregorius	s.8[ex]	F?	275 × 163	8	a	parchm.	–	–	–	–	[1,2]*
2 Kassel GHB Th.f. 65	Flavius	s.8/9?	F	219 × 118	19	a	parchm.	–	–	–	–	[1,3]
3 Bodley Marshall 19	Philon	s.9/12	F?	300 × 210	6	a	leather	–	–	+	+	[4]*
4 Autun BM MS 31 (35s)	Epist. Pauli	s.10?	F	420 × 300	?	?	leather	?	–	+	+	[5]
5 Darmstadt HLHB MS 2282	Boethius	s.12	F	261 × 131	61 ff	a	leather	–	+	+	+	[6]
6 Darmstadt HLHB MS 737	Solinus	s.12[ex]	F	278 × 197	40 ff	a	leather	parchm.	+	+	+	[6]
7 HAB Guelf. 1192 Helmst.	Psalterium	s.14	D?	160 × 125	50 ff	c	leather	linen	–	+	+	[7]*
8 HAB Guelf. 1357 Helmst.	Agenda exorc.	s.15	D?	170 × 140	48 ff	c	leather	–	–	–	–	[7]*
9 Tübingen UB Mc 91	Boethius	s.12	F	200 × 130	6	a	leather	parchm.	+	+	–	[8]
10 The Hague KB 73 J 7	Gregorius	s.12	?	205 × 145	14	b	leather	linen	+	?	?	[9]*
11 Basle UB MS O II 18	Law–book	s.13?	D	236 × 161	14	b	leather	parchm.	–	+	–	*
12 St Gall Cod. 1716	Epist. Canon.	s.12	CH	270 × 190	7	c	leather	parchm.	+	+	+	*
13 Cambr. UL Pembr 119	Anticlaudian	s.12	GB	150 × 105	10	b	leather	–	–	+	+	*

[1]Sewing: a, link stitch, b, long stitch, c, all-along on exterior supports

[2]References: [1] Christ (1937); [2] Thurn (1984); [3] Marshall (1993); [4] Vezin (1982); [5] van Regemorter (1948); [6] Knaus (1961); [7] D.-E. Petersen (1975); [8] Brinkhus (1990); [9] Storm van Leeuwen (1983 p. 16)

* indicates bindings examined by myself.

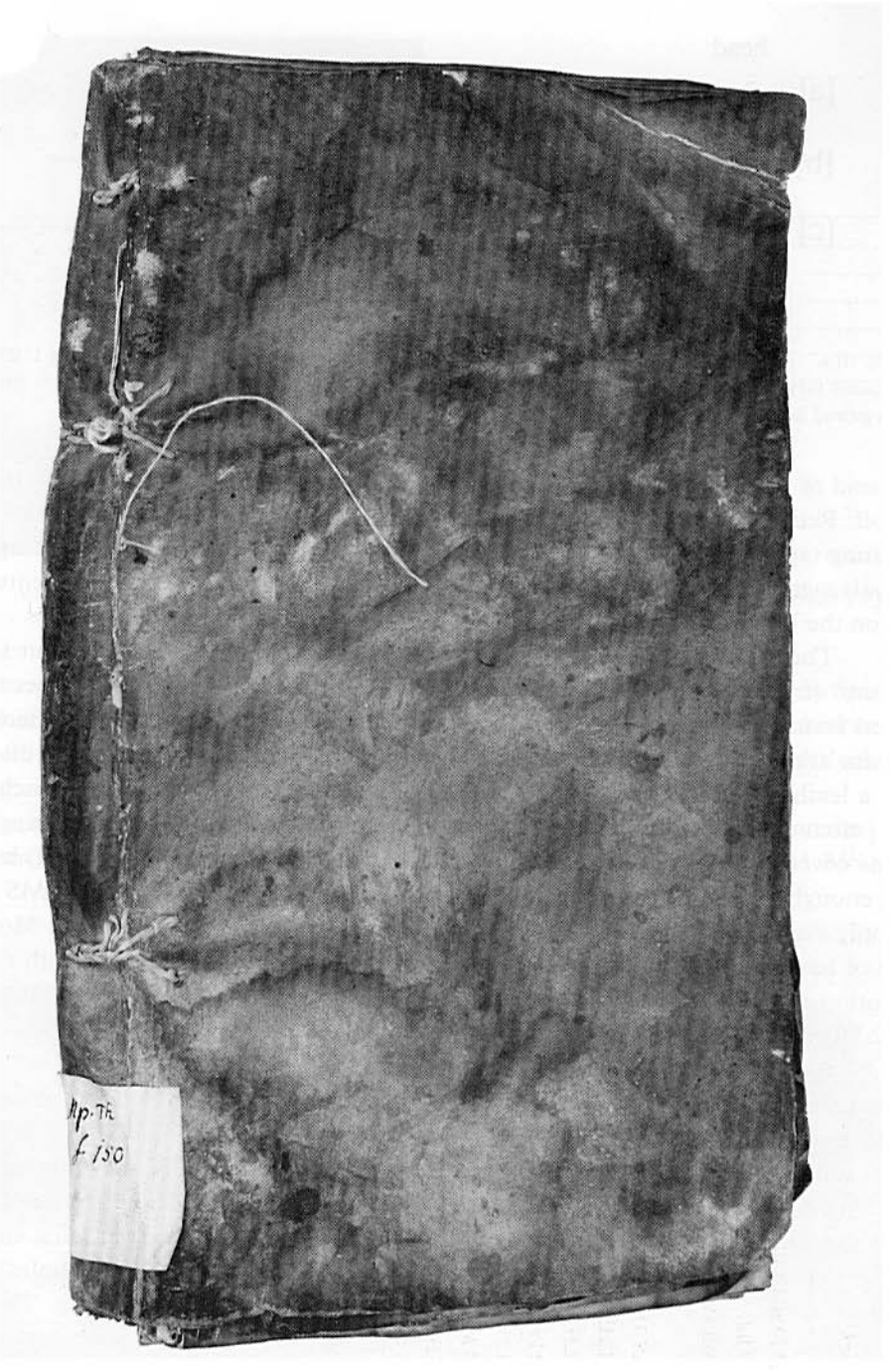


Figure 10.5 Parchment covering attached by link-stitch sewing (Würzburg UB Mp.th.f. 150, s. viii^{ex}, 275 × 162 × 30 mm).

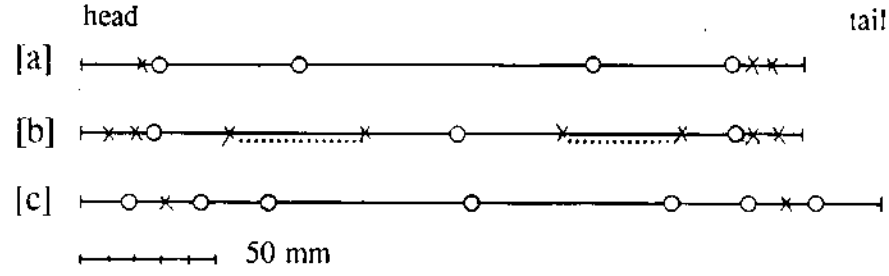


Figure 10.6 Sewing stations and sewing holes (o, employed; x, redundant) of: [a], Würzburg UB Mp.th.f. 150; [b], Kassel GHB Th.f. 65 (after Marshall [1993], fig. 30; the dotted lines indicate the probable previous sewing with a paired link-stitch technique); [c], Bodley Marshall 19 (see Table 10.1, nos. 1 to 3).

the head of the covering (see section 7.7, Figure 7.24); its counterpart at the tail has been cut off. Redundant sewing holes at the head and tail in the centrefolds might imply quire tacketing (see Figure 10.6[c]); it is believed that the binding structure is contemporary with the palaeographically dated manuscript of the early ninth century; a twelfth-century inscription on the lower cover provides the date *ante quem*.

The 10 limp bindings of the second group of Table 10.1 are not put together on account of their uniform sewing, which in fact varies considerably, but because of the shared feature of a soft leather covering, mostly white or off-white goat- or sheepskin. Half of them are lined with textiles (linen and silk); the edges of the covering are often finished with a leather edging (mostly pink), usually worked with a very fine whip stitch. The covering often overhangs the edges of the bookblock at the head and tail; on Tübingen UB Mc 91 the covering of soft natural goatskin (finished with a pink sheepskin edging) has been left long enough to fully envelop the bookblock like a kind of chemise. Basle UB MS O II 18, as the only example, has a brown leather covering decorated with blind tooling. Most bindings have or have had a front-edge flap, often of triangular shape and secured with ties or cords or button and loop fastenings; two buttonholes on the front-edge flap of HAB Cod. Guelf. 1192 Helmst. are evidence of a fastening with buttons.

As said above, the sewing structure displayed in these 10 bindings is not uniform: Tübingen UB Mc 91, even though it has link-stitch sewing, is included in the second group because of its soft leather covering. The covering of The Hague KB 73 J 7 is attached by single independent long-stitch sewing at two stations, at some 30 mm from the head and tail, with holes spaced 8 mm apart; the thick thread (*c.* 1.1 mm in diameter, 4z-S) passes from the centrefold through the quires, the cloth lining, a parchment back strip and the leather covering, showing the long stitches at the back (Figure 10.7). The holes correspond to those of the quire tacketing, a number of tackets having survived *in situ*. The sewing of Basle UB MS O II 18 is carried out with independent long stitches over four exterior supports of narrow strips of pink sheepskin (18 mm wide), which are solely decorative. The long stitches show buttonhole stitching along the edges of the supports and are further embellished with colourful embroidery (Figure 10.8). Finally, we encounter sewing on exterior supports of the slit-thong type on HAB Cod. Guelf. 1192 Helmst., HAB Cod. Guelf.

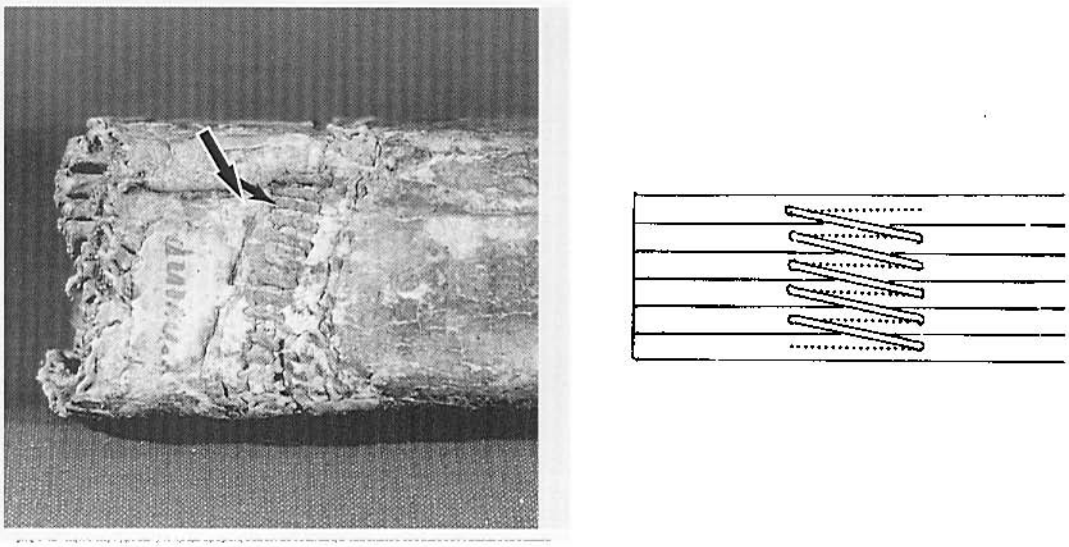


Figure 10.7 Attachment of the covering by independent long-stitch sewing (arrow) of The Hague KB 73 J 7 (s. xii, 205 × 145 × 36 mm); the diagram shows the spine pattern (cover omitted).

1357 Helmst. and SG Cod. 1716, with the slips cut off after the sewing had been finished. Figure 10.9 illustrates the binding of SG Cod. 1716 with the usual all-along packed sewing with a link-stitch type of change-over, the latter being hidden between the bookblock and the covering.

The second group of Table 10.1 is obviously not complete: three more twelfth-century French examples (BNF MS lat. 6614 and MS lat. 6231, Toulouse BM MS 165)

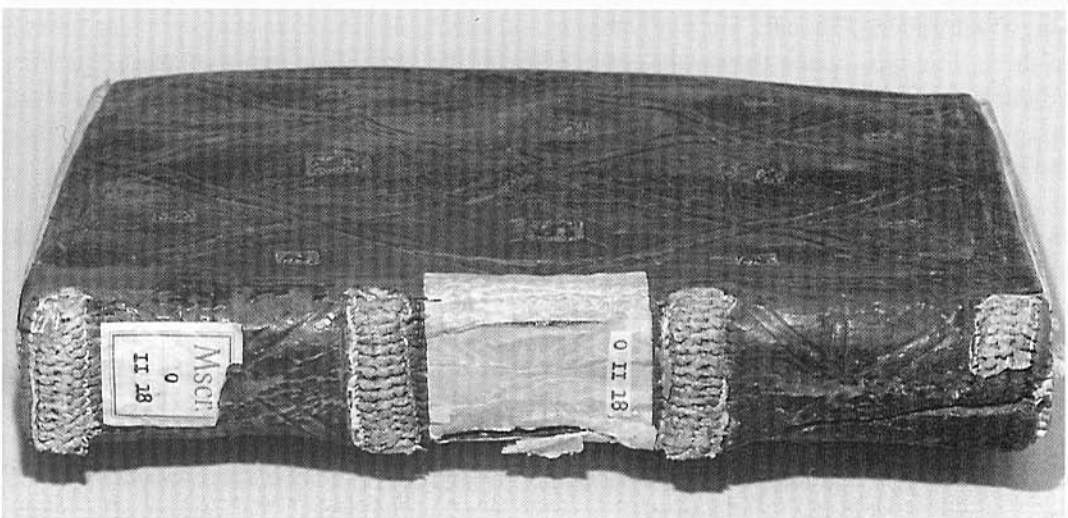


Figure 10.8 A blind-tooled limp binding of brown leather, attached by four independent long-stitch sewings, fully covered by coloured embroidery (Basle UB MS O II 18, s. xiii/xiv, 236 × 161 × 45 mm).

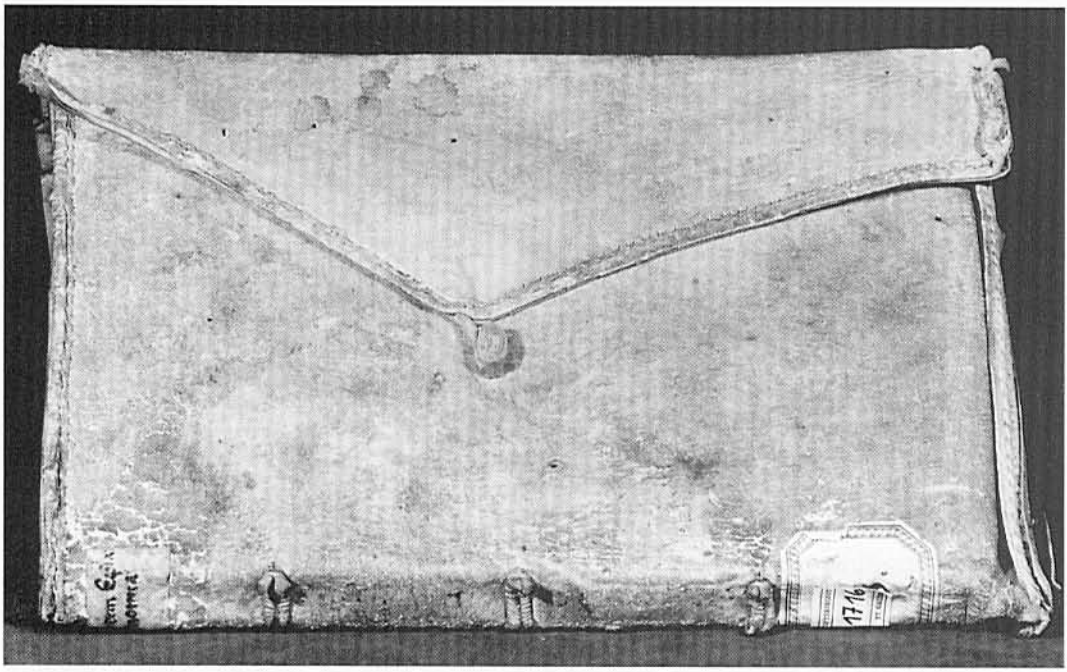


Figure 10.9 Limp leather binding of SG Cod. 1716 (s. xii; 270 × 190 × 25 mm), showing packed straight sewing on external supports. The leather covering has a pink edging, attached with whip-stitching; next to it a running stitch with blue thread (partly gone) joins the parchment lining. The loop for the toggle-type button is not preserved.

should probably have been added, since they also have a limp leather cover, cloth lining, leather edging and cover attachment by sewing; although Vezin (1976) mentions link- and long-stitch sewing, his data are not elaborate enough to conclude on the particular sewing of these bindings, hence they were excluded from the table. The fact that these bindings originate from France, like four other bindings from the second group in the table, makes one wonder whether soft leather coverings with leather edging had been a French style (see the brown edging at the perimeter of a French tab endband in Figure 8.17[b]).

Another binding that could be included in this group on account of its covering is a twelfth-century parchment manuscript (Cambridge UL Add. 8435). It is covered with a kind of chamois leather [goat?], lined with coarse linen and edged with brown leather, originally provided with a front-edge flap on the lower cover and two button and loop fastenings (loops of twisted leather extant). It is sewn on three sewing supports of twisted slit thongs of white leather, whose slips are employed for attaching the covering through lacing onto the back, a technique otherwise absent from this group (see section 10.7).

The three bindings with exterior supports in Table 10.1 (nos. 7, 8 and 12), which are all covered in leather and seem to originate in Germany, could suggest that this type of binding prevailed in the Germanic area possibly in an earlier period. Yet various other obviously German bindings I studied (for example Zurich ZB MS C 10e, *c.* 1335, parchment binding with three single-thong exterior supports), and several more studied by Schunke in

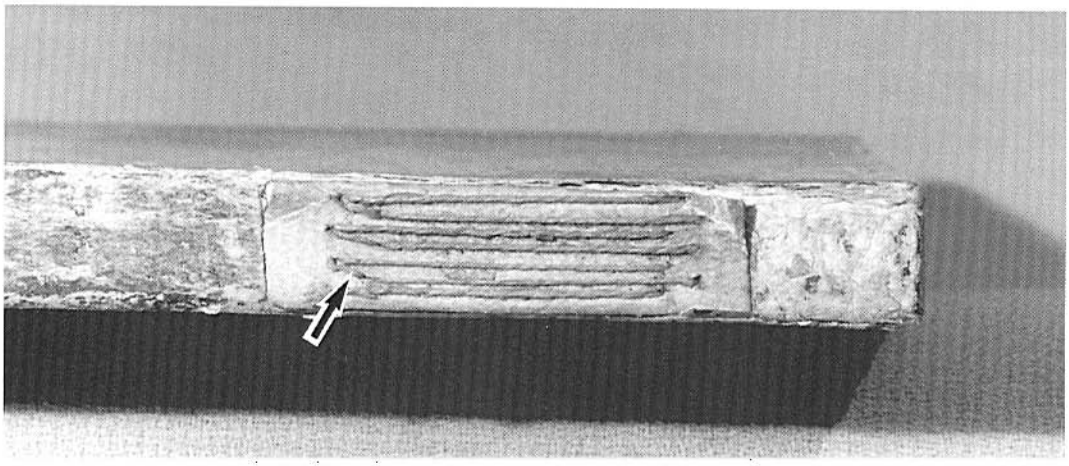


Figure 10.10 An Italian stiff paper covering with turn-ins, staggered archival sewing (see section 10.4) to two parchment supports through the covering and the conjoint paper endleaves (shown the tail part with seven long stitches, corresponding to the seven quires); note the oblique change-over spans (arrow); (Amsterdam UB Inc. 2, Florence imprint of 1500).

the Palatina Collection, have in fact parchment coverings. Five similar parchment bindings with exterior supports were found in the Ramey Collection (Pickwoad 1995 fig. 13, note 69) but these are clearly of French origin dating from as late as the mid-sixteenth century. As a few other slightly earlier sixteenth-century French bindings are added to this list, it might be suggested that this type of parchment binding is associated with the early printing era. All examples discussed above are indeed not the latest application of the principle of attaching the covering in one operation with the textblock sewing. Such simple parchment and later paper coverings continued to be made in Europe for several centuries; there are even examples from the twentieth century.[10] As exterior supports were more and more often substituted by parchment or omitted altogether and the problem of perforation and tearing of the covering became prominent, modifications to the sewing were introduced, such as staggering the sewing holes and reducing the number of holes by sharing one hole for the stitches of a couple of quires. The stiff paper binding of a Florence imprint of 1500 (Figure 10.10), as frequently found on Italian incunabula (though probably intended to be solely temporary), is an example of a later survivor of such binding structures (see also Cloonan 1991 pl. 10). A further example is the English late sixteenth-century parchment binding without supports (Figure 10.11), which at the same time demonstrates a common shortcoming of limp bindings, namely the concave distortion of the spine.

10.4 PRIMARY SEWING THROUGH RIGID BACK PLATES

Another type of limp binding has its parchment covering also joined to the bookblock in one operation with the primary sewing, but has its back reinforced with back plates, which

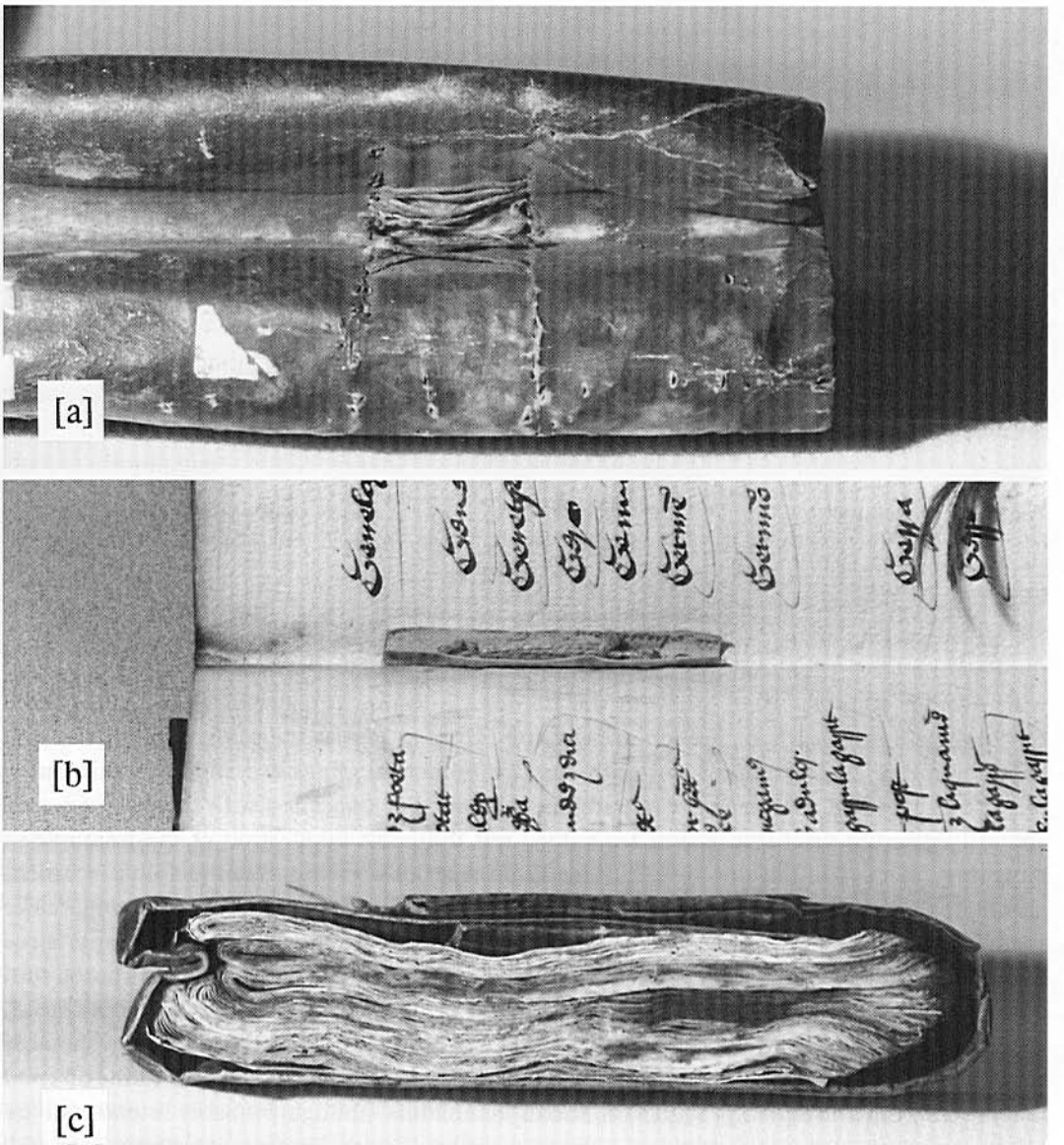


Figure 10.11 Limp parchment binding of a paper manuscript, dated *c.* 1600: [a], sewing holes and remnants of the thread on the back; [b], parchment stay in the centrefolds; [c], distortion of the spine, shown at the tail (Shrewsbury School Library MS 14, 230 × 185 × 35 mm).

are a particular type of exterior supports. These back plates are made of rigid materials like horn, wood (usually covered with leather) or thick leather, obviously intended to prevent distortion of the spine. The modest decoration that they sometimes received has made them of some interest in the literature on decorated bindings. The earliest authors like

Westendorp (1909 nos. 111, 112), Adam (1910a), Eichler (1923), Husung (1925) and Sichler (1925) confined themselves mainly to their decorative aspects; only Adam (1910a) paid some attention to the binding structure. Loubier (1926 p. 9) illustrated nine examples from Erfurt and introduced the rather ambiguous terms '*Kettenstich*' and '*Langstichheftung*'. The list of extant examples was further supplemented by Schreiber (1928), Hamanová (1959 p. 63, fig. 44), Paulhart (1968), Jäckel (1974) and Clarkson (1978b). The first systematic investigation of this type of binding was the census of Alker (1965; 1966) at Vienna ÖNB. D.-E. Petersen (1975) catalogued nine bindings from Wolfenbüttel HAB, which he presented with detailed photographs, and put them in their deserved place within the history of medieval binding structures.

The above references refer to a total of about 140 bindings, dating from *c.* 1375 to 1500; they originate mostly from Austria, Germany, Poland, Bohemia and Switzerland and a few probably from Italy. They are nearly exclusively on literary manuscripts on paper and occasionally on parchment (only 12 are on archival records). It seems intriguing that these bindings fall into three distinct heights of *c.* 150, 210 and 300 mm (see illustrations in Husung [1925 p. 11, fig. 27] and Loubier [1926 p. 9, fig. 10]). The covering is largely of coarse parchment, sometimes of two pieces pasted together, some lined with paper, cut off flush with the bookblock; limp leather coverings or leather edging are exceptional. The lower cover usually extends to a rectangular front-edge flap, with one or two cords to tie them around flat buttons of horn, leather or metal on the back (Figure 10.12).

The majority of the back plates mentioned in the above literature is of leather (56 per cent), followed by horn (37 per cent) and wood (7 per cent). Usually back plates extend to the full length of the back, sometimes they may comprise two shorter pieces. Leather back plates are often decorated by punching out simple geometrical shapes which are underlaid with a differently coloured material; the same effect could be achieved with horn of different shades. Parallel indented lines on back plates, running in the spine direction and spaced 3–5 mm apart, have been considered as decorative, but are more likely to have served as a guide for positioning the sewing holes, which required exactitude.

As already said above, limp bindings with back plates have been divided into two categories, designated with Loubier's indistinct terms as bindings with '*Kettenstichheftung*' and those with '*Langstichheftung*'. Bindings belonging to the former category, which account for *c.* 40 per cent of the 140 bindings in the literature, are in fact one of the many variants of link-stitch sewing on multiple stations. The chains are visible on the back plate, occasionally running obliquely or even in circles. Adam (1910a) analysed this structure and found that the equal number of chain links at each sewing station could be obtained by alternately omitting linking at the intermediate stations.[11] This follows from the fact that, with a routine link-stitch sewing, the number of links at the change-over stations equals half of those at the intermediate stations (see Figure 2.1[e]). My examination of the three bindings shown in Figure 10.12 has confirmed Adam's findings. The fold pattern in Figure 10.13 illustrates this alternate omission of the linking. Some chains are not functional but are solely decorative: the circular and two of the perpendicular chains on HAB Cod. Guelf. 892 Helmst. (see Figure 10.12 [centre]), are chain stitches 'embroidered' onto the back plate before sewing.

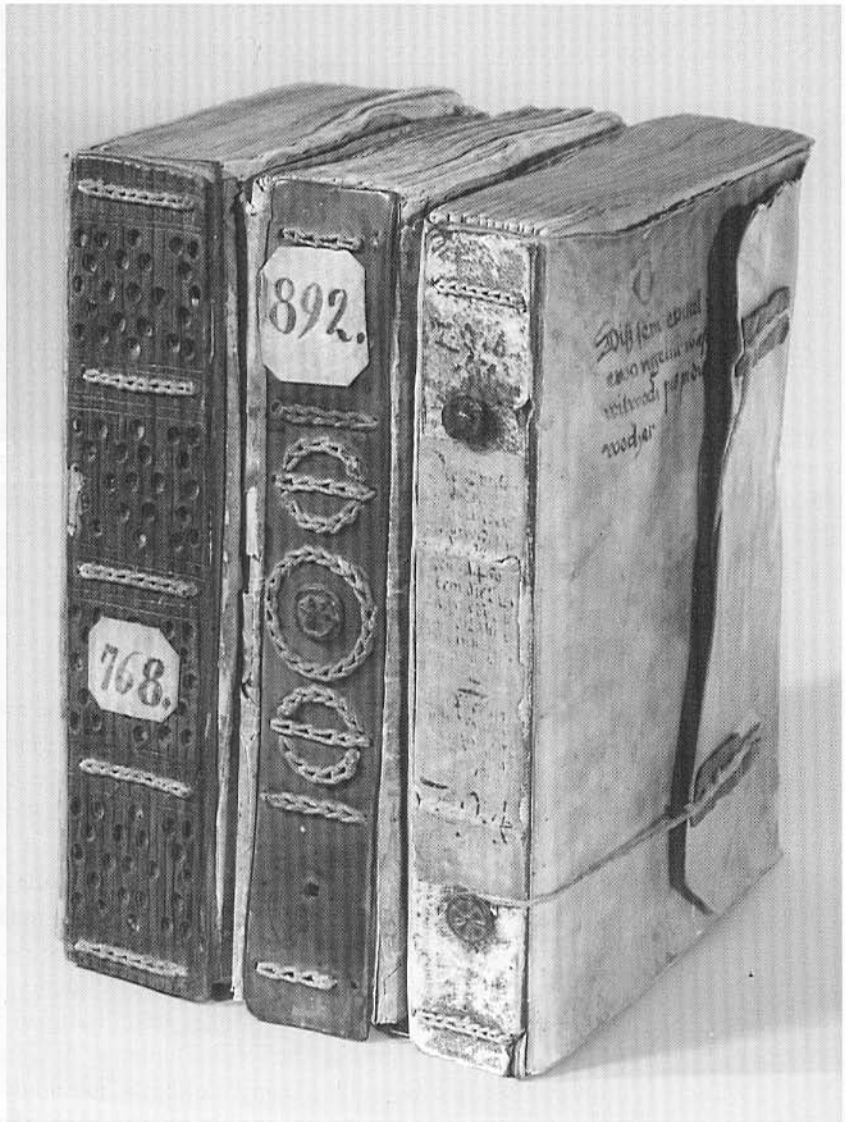


Figure 10.12 Limp bindings with link-stitch sewing: (left), back plate of wood, covered with brown leather, showing parallel ruling and punched decoration (HAB Cod. Guelf. 768 Helmst., 215 × 160 × 52 mm); (centre), back plate of horn, part of the link stitches (the circles and second chain from head and tail) are not functional, in the middle lead button (HAB Cod. Guelf. 892 Helmst., 215 x 155 x 35 mm); (right), back plate of beech, covered with pink sheep, two lead buttons, one cord tie still intact (HAB Cod. Guelf. 29.4. Aug. 4°, 210 × 170 × 37 mm); (from D.-E. Petersen 1975).

Bindings of the second category have turned out to comprise at least three entirely different sewing structures (which are distinct in their fold pattern): (a) archival sewing, (b) sewing with independent long stitches and (c) all-along sewing with standard change-over. Therefore, it is obvious that a single term, namely '*Langstichheftung*', cannot account for

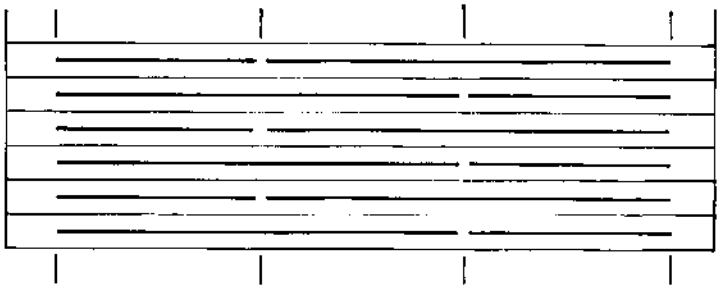


Figure 10.13 Fold pattern of the link-stitch sewing of the binding shown in Figure 10.12 (right); (HAB Cod. Guelf. 29.4. Aug. 4°; only the first six quires are shown).

these three different structures and hence should be avoided. Examples of these three sewing structures as perceptible on the back are illustrated in Figure 10.14.

HAB Cod. Guelf. 673 Helmst. (Figure 10.14 [left]) represents archival sewing (German: *Aktenstich* [Rhein 1954 p. 29]; Italian: *stile archivio* [Giuffrida 1975 pp. 8/9]) which makes use of paired stations and has three basic variants: archival sewing can be used to join the leaves of a single quire with or without covering (Figure 10.15[a]). But instead of knotting off a quire, the sewing may be continued with a multifold of quires [b]. Here, the change-over takes place with a span at the two inner stations and not at the outermost stations; the span may be hidden under the covering. In the third variant [c] the two outermost stations have been shifted towards the edges of the bookblock. If the series of spans are not hidden but in view on the back, they may receive additional links or decorative stitches. The fold pattern of the particular archival sewing on HAB Cod. Guelf. 673 Helmst. is shown in Figure 10.16[a].

Archival sewing as seen on the back is easily confused with sewing using independent long stitches. HAB Cod. Guelf. 20.12.1. Aug. 4° (Figure 10.14 [centre]) is an example of the latter type of sewing, which in this case has made use of joint holes for two stitches over two separate leather back plates. This type of sewing can only be detected by inspecting the fold pattern, which shows separate long stitches corresponding to those on the back (Figure 10.16[b]).

The third type of sewing, namely all-along sewing with standard change-over, characteristically shows on the back link-stitch chains at the change-over stations and sets of long stitches. This type of sewing (being the most frequent of the three sewings) is represented by HAB Cod. Guelf. 931 Helmst., whose sewing pattern on the back is shown in Figure 10.14 [right] and whose fold pattern is shown in Figure 10.16[c]. As in HAB Cod. Guelf. 931 Helmst., the back plate is usually a single piece, but may comprise two shorter ones, in which case each plate shows one set of long stitches and one or two link-stitch chains. Separate back plates with a set of long stitches and two link-stitch chains each are obviously sewn with independent sewings.

The long stitches on the back plate are interwoven with thread, sometimes of different colours. In the past this structure has been interpreted as decoration or as a mechanical protection of the exposed sewing threads. However, it might have been employed in

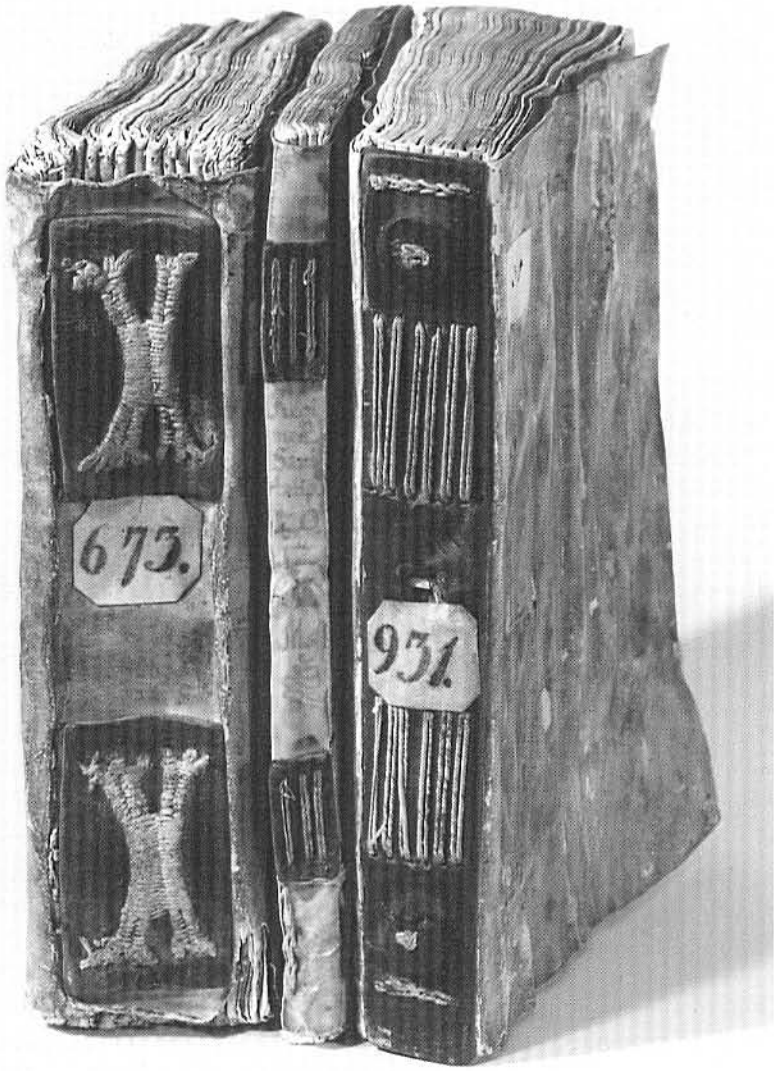


Figure 10.14 Limp bindings with various types of *'Langstichheftung'*: (left), archival stitch showing interwoven long stitches over two separate back plates (HAB Cod. Guelf. 673 Helmst., 210 × 160 × 50 mm); (centre), two independent long stitches over two separate back plates of brown leather (HAB Cod. Guelf. 20.12.1. Aug. 4°, 215 × 160 × 15 mm); (right), all-along sewing with link-stitch type of change-over, back plate of brown leather, two leather buttons for closing with cord ties (the latter lacking; HAB Cod. Guelf. 931 Helmst., 212 × 160 × 35 mm); (from D.-E. Petersen 1975).

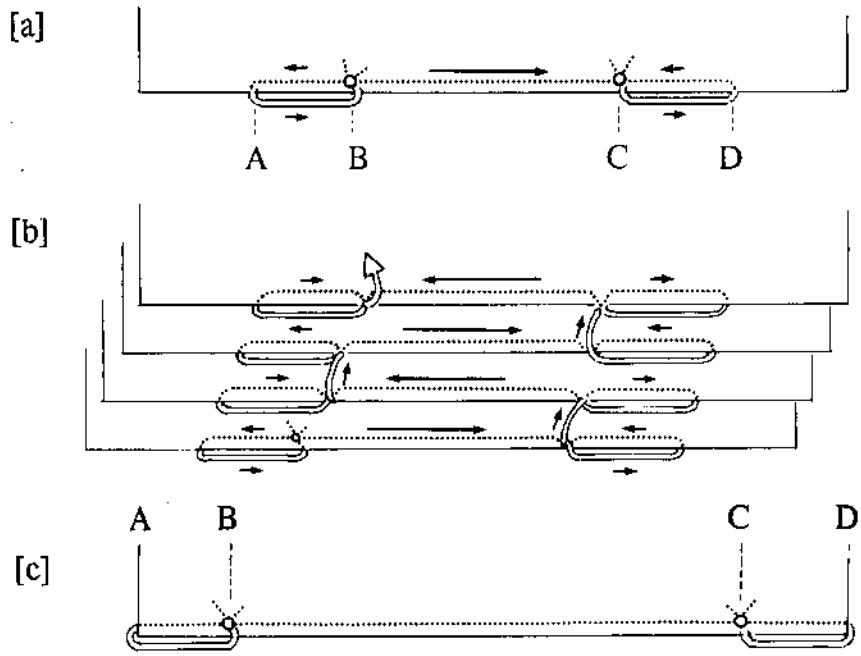


Figure 10.15 Variants of archival sewing: [a], archival sewing to secure a single quire, starting at the second sewing station and ending (knotted off) at the third station; [b] continuing archival sewing, joining several quires, the span type change-over taking place alternately at the second and third station; [c], archival stitch shifted to the head and tail (it can be used for single quires or for continuous sewing).

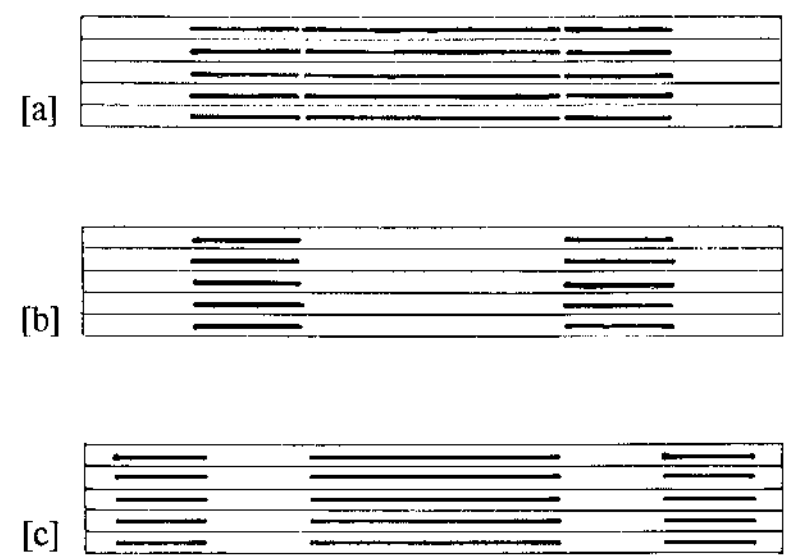


Figure 10.16 Fold patterns (not to scale) of the three bindings shown in Figure 10.14: [a], archival sewing showing connection between the two long stitches; [b], two independent long stitches; [c], all-along sewing with link-stitch change-over.

order to tighten the sewing, which is difficult to work tightly when rigid back plates are involved. To a certain extent this slackness of the sewing can be corrected by basket weaving over the long stitches on the back which pulls together the thread. This mechanical effect has already been spotted by D.-E. Petersen (1975 p. 71).

10.5 BOOKBLOCK ATTACHMENT BY SECONDARY TACKETING

While cover attachment can be effected by primary tacketing, as described in section 10.2, it might also be realized by secondary tacketing: the quires of a volume are first joined by any standard method of sewing and the sewn bookblock is then attached to the covering by means of tacketing. The sample on which the following account is based comprises 30 limp parchment bindings, virtually all of which originate from the Netherlands and date from the sixteenth century (the majority date from 1550 to 1577, the earliest from the late fifteenth century). Eight are on paper manuscripts and 22 cover printed books on paper; 13 of the printed books belong to the library of Jacob Buyk and have been the subject of an earlier study by Gnirrep and Szirmai (1989). These 30 bindings constitute a fairly homogeneous group of small volumes (average height *c.* 160 mm, the number of quires ranging from 14 to 50) with plain parchment coverings attached with two or three horizontal or vertical tackets visible on the back (see Figure 10.17).

While 20 bindings have their outer quires provided with a flange or a hooked-around single leaf of used parchment, occasionally in connection with one or two further leaves of paper (see Figure 10.25[c], [d] and [g]), only six bindings have separate endleaf quires of either a single or double bifolium with a flange or a single leaf of used parchment [i], [l] and [m].

Two distinct types of sewing on interior supports have been observed: (a) single or packed straight sewing and (b) independent long-stitch sewing. The majority (24) of the 30 bindings shows sewing type (a); the earliest binding, a manuscript from the Utrecht area and the late fifteenth century (Liège, Bibliothèque universitaire MS 2593), is the only instance with herringbone sewing. All 24 bindings have a link-stitch type of change-over, six of them having a two-step link stitch (see Figure 10.18); the sewing is usually carried out on slit-thong supports (ten white, eight brown leather) and at times on double cords (six). In 20 bindings the supports are reinforced with metal rods made of brass and occasionally of iron (1.0 to 2.4 mm in diameter).[12] These rods are integrated into the sewing usually in such a way that the loops of one half of a support encircle a rod (Figure 10.17[b] and Figure 10.18). On bindings with more than two sewing stations the metal rods are usually placed only at the outermost stations. Slit-thong supports are cut away flush with the spine width or left with short slips of no more than 10 to 15 mm. Double cord supports are always left 40 to 50 mm long at either end.[13]

The remaining six bindings, which are of earlier date (before 1520), are sewn with sewing of type (a). They have supports made of blocks of what appears to be rawhide, white-grey and extremely hard (one such block is of thick brown leather). These block supports measure 4 to 6 mm in thickness, they are the same width as

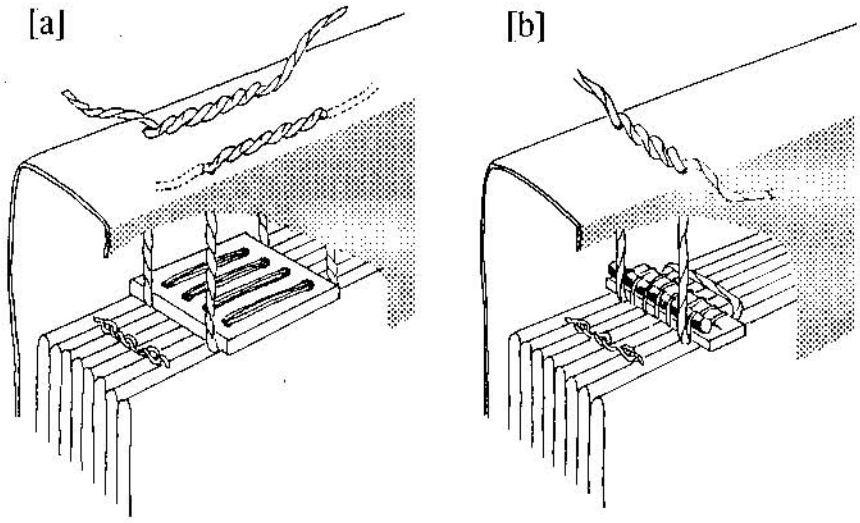


Figure 10.17 Diagram showing the construction of two types of limp bindings with hidden interior supports, attached by indirect tacketing: [a], sewn on a perforated rawhide block; [b], reinforced with a metal rod, integrated into the sewing on slit thongs (slips cut off). In both cases the ends of the parchment tackets are tucked in under the cover.

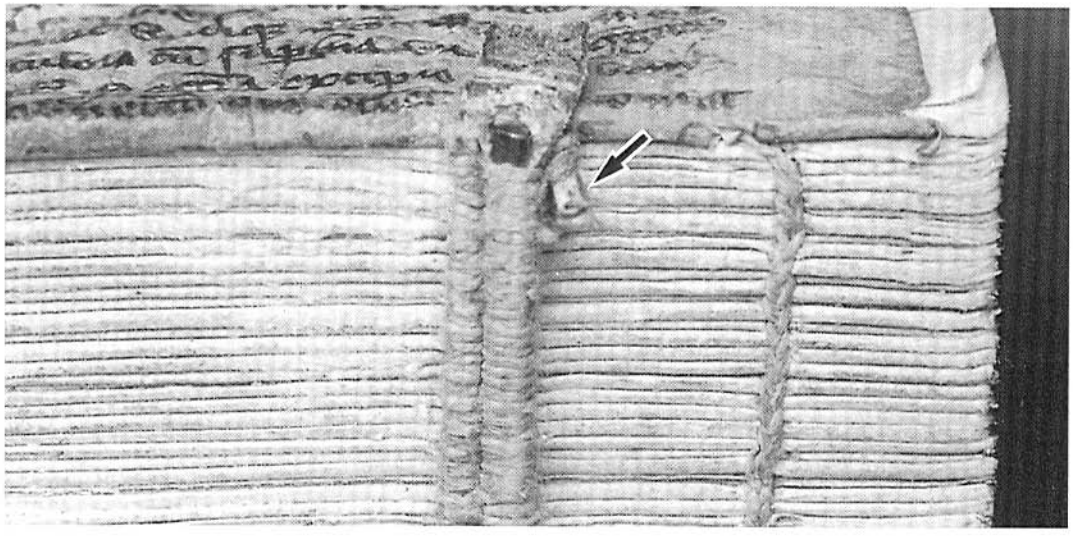


Figure 10.18 Packed straight sewing with two-step link-stitch change-over, on white slit-thong supports, with a brass rod (2.2 mm diameter) included in the distal support part; the cover had become detached, a remnant of the tacket (arrow) survives (Nijmegen UB P.Inc. 47, Antwerp imprint of 1540).

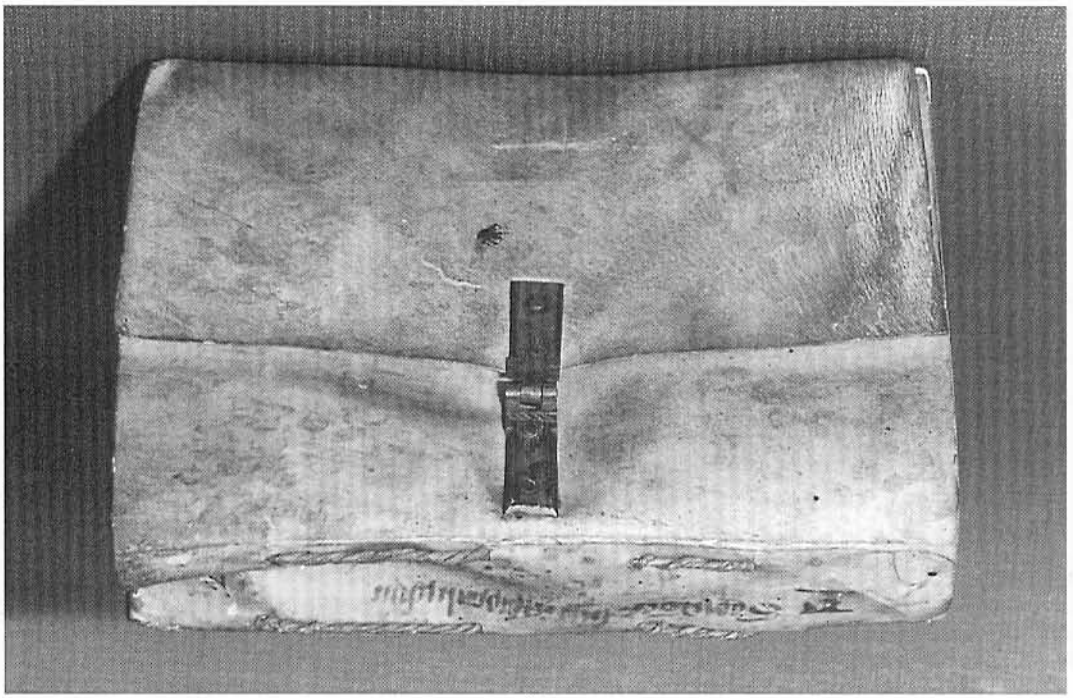


Figure 10.19 Secondary tacketing of the covering, square flap with brass fastening on the upper cover (Buyk collection, Amsterdam UB 277 G 38, Paris imprint of 1512, 150 × 108 × 30 mm).

the spine of the bookblock and *c.* 45 mm high. They are perforated with two rows of holes to accommodate the long stitches. Both block supports are incorporated into an independent long-stitch sewing with two or three stitches sharing one sewing hole (see Figure 10.17[b]).

Tackets of twisted parchment are used to attach the bookblock to the covering. With sewing type (a) the tacket is anchored between the spine and the support and its ends traverse the covering to be twisted on the back; the ends are usually tucked back under the covering. The tackets, one each for the outermost stations, run across the back (see Figure 10.17[b]). With sewing of type (b) the width of the block support seems to have called for the use of two tackets; usually they are employed as described above, but may traverse the centrefold of the outer quires using the corresponding holes in the block support. The two tackets attaching one block support run along the back (see Figure 10.17[a]). The same effect can be obtained on the back with four short tackets anchored by knots in the centrefold of the outer quires. Yet, in fact, tacketing may be carried out at any arbitrary position independent of the sewing stations or block supports.

The parchment coverings of 14 bindings are flush with the bookblock, 10 slightly extending from the bookblock at the head and tail (5 to 10 mm). Eight bindings have square front-edge flaps, three of them furnished with a metal fastening (Figure 10.19). However, chamois leather ties for closing the book are more common (7 to 10 mm wide,

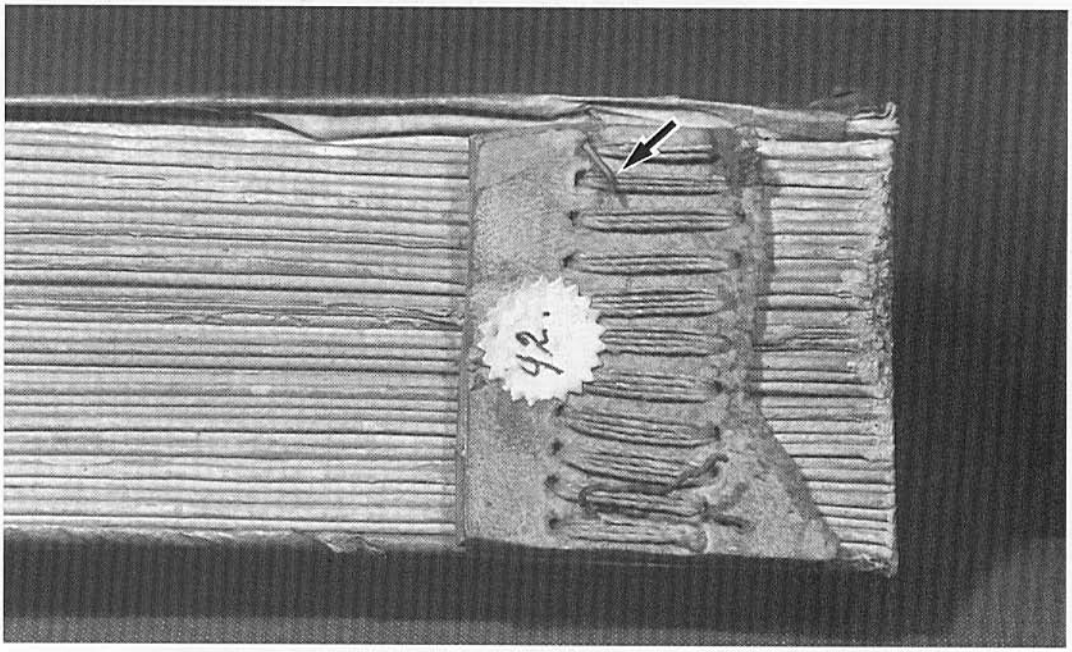


Figure 10.20 Rawhide block support, 57 × 45 × 2.7 mm, with 11 pairs of holes, through which 37 quires were sewn with independent long stitches (tail portion is shown). Arrow points to the tacket fragment which originally held the now lost cover (Utrecht MCC ABM o.d. 92).

150 to 170 mm long, tapering ends); in Figure 10.27 a number of variant ways of anchoring ties to the covers can be seen.

Literature on bindings with secondary tacketing is rather scant. Rhein (1942a) mentions secondary tacketing for parchment coverings on incunabula in the Amplonian Collection in Erfurt, with the earliest date of 1497. H. Petersen (1988 p. 104) found a Cologne imprint from 1574 with brass rods over slit-thong supports, which could be quoted as an example supporting the proposition that the employment of metal rods was restricted to the Low Countries and Rhineland/Westphalia (Gnirrep and Szirmai 1989).

As secondary tacketing is not a highly sound and durable method of cover attachment, we are fortunate to know of the occasional binding which allows full view of the spine pattern and possibly even examination of fragments of tackets. Nixon's failure to notice vestiges of secondary tackets on an incunable from Deventer led him to the assumption that this binding never had a covering and further to the postulation of the 'open-backed' binding structure (Nixon 1956 p. 23). A similar binding was thought to have been found by Obbema (1973 p. 37) on a 1494 Nuremberg incunable, originally owned by the Brethren of the Common Life in Deventer (Utrecht MCC ABM o.d. 92; see Figure 10.20). Careful examination during the restoration work of the seemingly 'open-backed' binding of a compendium of several Dutch incunabula (The Hague KB 151 F 2),[14] which revealed remnants of secondary tackets, led in due course to the re-examination of Nixon's and Obbema's material; it became evident that the 'open-backed' bindings mentioned above are

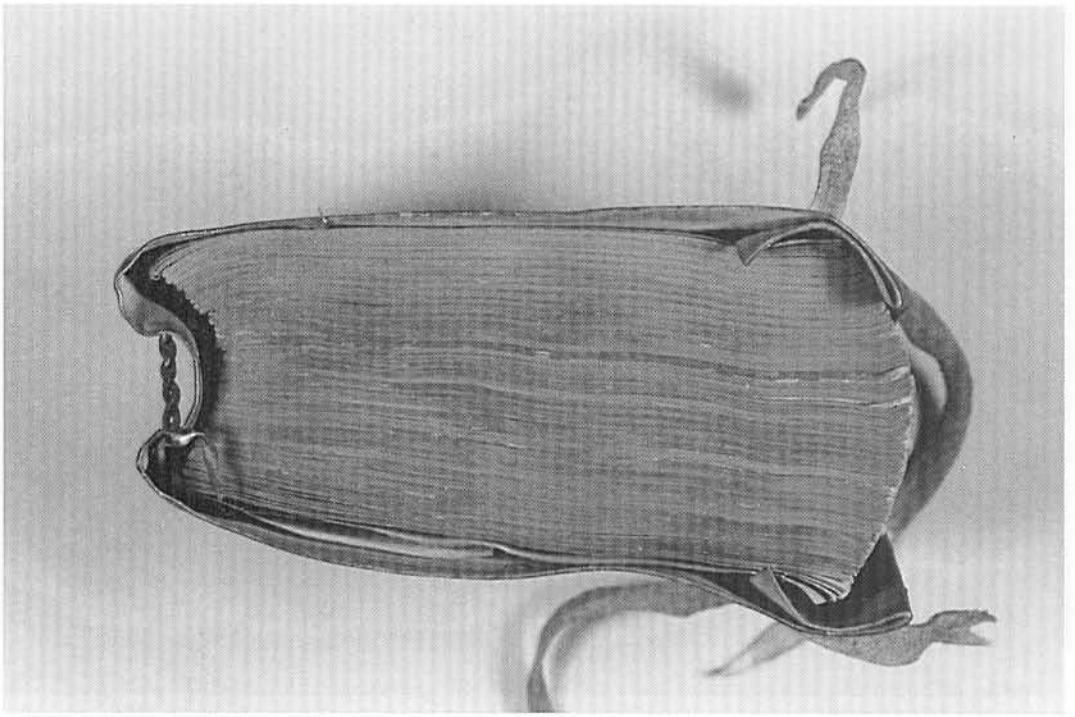


Figure 10.21 Distortion of the textblock in spite of inclusion of two brass rods (2.2 mm diameter, 40 mm long) into the sewing, probably due to traction of the parchment tacket which managed to bend the rods (Buyk collection, Amsterdam UB I F 28, paper manuscript, s. xvi).

nothing other than bindings that have lost their covering (van Leeuwen and van Thienen 1995).[15]

Did the metal rods serve any meaningful purpose such as preventing the spine from distortion? Indeed, most of the 30 bindings studied have nice straight backs, but at the penalty of being very difficult to open. However, there are a few bindings with metal rods with a concave distortion of the spine; this unintended effect might have been brought about by the contraction of the parchment tackets (Figure 10.21).

Finally, as pointed out before, back plates were also made of wood, even though less frequently. Unfortunately, the only two examples I have encountered do not allow for a complete elucidation of their structure. Leiden UB BPL 2483 is a small tacketed parchment binding on a sixteenth-century manuscript containing Benedict's Rule, probably from the eastern Netherlands;[16] it shows two protruding areas at the back which turn out to have been caused by two pieces of wood (*c.* 60 × 30 × 12 mm). Through these two wooden blocks the bookblock is connected to the covering by means of tackets of white leather lacing (4 to 5 mm wide) (Figure 10.22). The sewing, which could not be determined because of the stiffness of the binding (either link-stitch or pamphlet sewing), makes use of five sewing stations that are not in register with the wooden blocks. The other such example is a small binding of The Hague KB 73 G 39, which comprises a collection of Middle

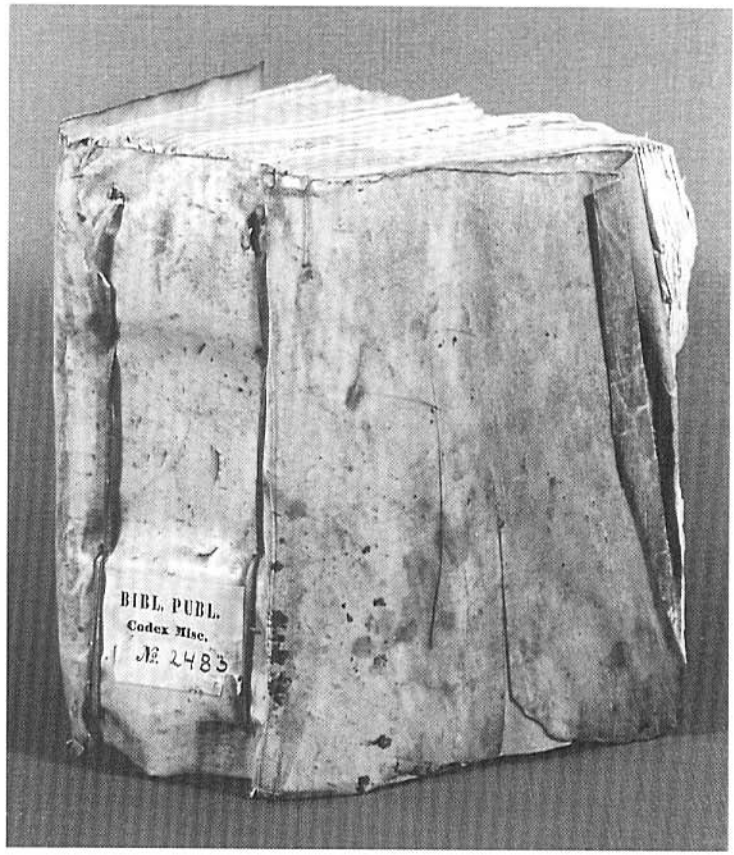


Figure 10.22 Two wooden plates are hidden under the parchment covering and used for tacketing with leather lacing (Leiden UB BPL 2483, s. xvi[1], 144 × 106 × 60 mm).

Dutch texts from the late fifteenth century.[17] It is sewn with two independent long stitches through a wooden block support (one still preserved) of *c.* 29 × 29 mm in dimension, which is sandwiched between a folded piece of parchment (*c.* 29 × 45 mm). The sewing holes have been pierced through the parchment, just at the edge of the wooden block supports; the stitches of two or three quires make use of one hole. Remnants of coarse cord might be part of the tacketing.

10.6 LEDGER BINDINGS

Ledger bindings are, in fact, a variant of the bindings with secondary tacketing; yet they share a set of common characteristics which justifies their separate treatment. They have limp, semi-limp or stiff-board covers (occasionally of parchment but usually of leather and often decorated in blind and gold tooling), attached to the bookblock by means of parchment tackets or leather lacing through overbands on top of the covers. These bindings were

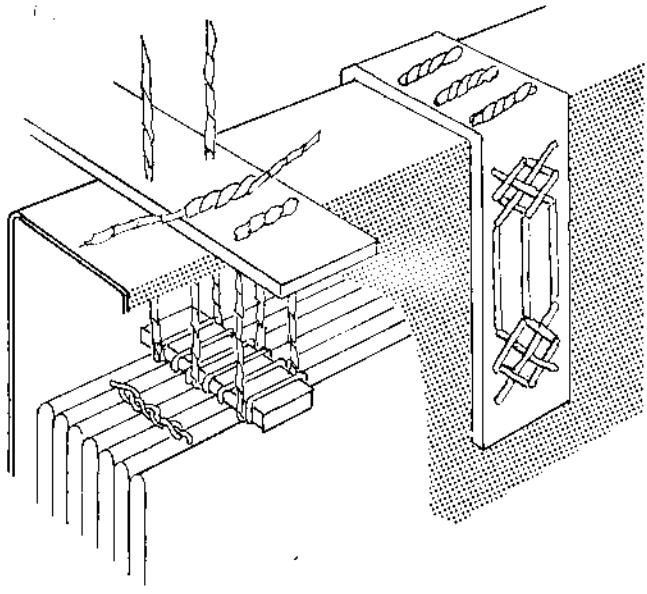


Figure 10.23 Diagram of the construction of a sixteenth-century ledger binding.

used for trade journals, accounts and archival records throughout Europe since at least the early fifteenth century and until the mid-nineteenth century; according to Middleton (1963 p. 140) they had already appeared in the fourteenth century. The earliest reports on ledger bindings concern archival records originating from 1495 Lübeck (Fink 1939), 1496 Bern (Sichler 1925) and 1505 Vienna (Alker 1965). Illustrations of decorated examples from Italy dating from the second half of the fifteenth to the first half of the sixteenth century are found in De Marinis (1960 vol. 1 nos. 323, 1049, 1461, 1170, 1225); Germany with its less elaborate decorated ledger bindings is documented by Adam (1910b) and Loubier (1926 fig. 11), France by Gruel (1905 vol. 2 p. 138) and England by Bearman, Krivatsy and Mowery (1992 p. 50). A variant of a ledger binding is the Flemish blank book, embellished by panel stamping (presumably by means of woodblocks) with moral phrases referring to the trade, like '*Tenes bon compte de par Dieu*' (Indestege 1961).

There is little information on the construction of late medieval ledger bindings. In Prediger's eighteenth-century bookbinding manual we find a chapter on the '*grossen Kauff=Register mit gleichen Rucken, welche man insgemein die gleich geschnürte Bände nennet*' (1741 vol. 1, pp. 195–7), where he describes double supports of pigskin with a wooden plate sandwiched in-between and gives instructions for gluing up the spine and lining it with cloth; the spine should be retained flat and the leather cover with a front-edge flap should be attached to the bookblock by twisted pigskin tackets at the back. The slightly later French bookbinding manual by Dudin (1772 chap. 6, pl. XIV), which designates ledger bindings as 'Lyonnese bindings', mentions double cords which alternate with stations of link stitches to ensure the strongest possible sewing; the bookblock is attached to the leather cover and the overbands, using tackets and decorative lacing. A sixteenth-

century example was described in some detail by Adam (1910b), with sketches of the sewing on single thongs, tacketing through the covering and overbands, essentially as shown in Figure 10.23. Sichler (1925), who describes a Bern account book from 1496 comprising 12 quires with unsupported link-stitch sewing on five stations, plainly mentions its parchment covering which is attached with nine twisted parchment tackets through three brown overbands.

Adam (1911b), apparently unaware of the description in Prediger's manual, was surprised to find in 1552 ledger bindings of the city council of Breslau (now Wrozlaw, Poland) double thong and cord supports reinforced with flat sticks of beechwood. He assumed that the concave distortion of the spine was the result of residues of blotting-sand caught between the centrefolds of the quires, ultimately leading to the breakage of the wooden sticks: '*der Streusand hat den Sieg behalten*', he concludes somewhat amused, convinced that the sticks were the design of a layman, since a well-trained craftsman ('*ein gelernter zünftiger Fachmann*') would not have dared '*so vom Handwerksgebrauch und Sitte abzuweichen!*'. Paul Adam was right in doubting the wisdom of this kind of artificial stiffening of the spine to prevent distortion, but he was wrong in ascribing it to unqualified clerks – generations of bookbinders before him employed such measures again and again to counteract the inherent tendency of the spine to become concave, usually with limited success. Blotting-sand was not the main cause, since we know of many printed books with similarly distorted spines, which obviously have never required such blotting measures. An extreme example of such distortion of a ledger binding is given in Figure 10.24.[18]

10.7 ATTACHMENT BY LACING-IN THE SEWING SUPPORTS

When this type of covering attachment was introduced has not yet been determined. It is analogous to the gothic board attachment, restricted to a narrow area along the joints: the slips of the sewing supports exit through the covering at the spine edge and make a short stitch to return underneath the covering, where their ends are left loose as such or affixed to the inner face of the cover with adhesive or otherwise. Even though the better-known examples date from the late fifteenth and the sixteenth centuries, a few earlier ones exist. Coverings are customarily made of parchment and rarely of leather.[19]

Limp parchment bindings have been used all over Europe in many variants; some may have been intended solely as a temporary measure, but for the most part they were put to good use as such, cherished for their cheap, sturdy and economical binding structure. So ubiquitous and common were they that the description of their structure did not seem necessary. Rhein (1942a) reported on laced-in limp parchment bindings on incunabula of the Amplonian Collection at Erfurt and provided a brief description mentioning endleaves or single reused parchment leaves hooked around the outer quires, sewing on double thongs or cords, coverings of heavy parchment cut off or turned in flush with the bookblock or left protruding at the head and tail, lower covers extending into a front-edge flap and sewing support slips laced through two or three slits in the joint region of the covering.

I have studied *c.* 40 laced-in limp parchment bindings from the Netherlands, 20 of

Figure 10.24 Example of extreme concave distortion of the spine of a ledger binding from 1546 (Ljubljana, Arhiv Republike Slovenije, Carn. 2, 430 × 300 × 230 mm).

which were part of the Amsterdam Buyk Collection and have been the subject of an earlier study (Gnirrep and Szirmai 1989). This Dutch sample comprises four paper manuscripts and 36 printed works dating from 1507 to 1595 (mostly between 1550 and 1580). The bindings are relatively small (the majority with a height of 140 to 170 mm) and contain on average 27 quires (ranging from 10 to 52). Most of them have one of the great many variations of endleaf constructions (Figure 10.25): 21 with modified outer quires [a–g], 14 with endleaf quires [h–m] and five without any endleaves. The majority of bindings (31) is sewn on three sewing stations, the remainder on two (2) or four stations (7). The most common sewing supports are single thongs (20 brown, 5 white leather), followed by slit thongs (9 of white, 3 of brown leather) and double cords (3). The width of the thongs ranges between 5 and 8 mm; in ten instances suspension holes in the slips testify to the use of a sewing frame. The sewing holes, as a rule, are pierced during the sewing process. The sewing is usually straight all-along, but occasionally packed; generally, the sewing starts with the first quire. In 12 cases the change-over is of the two-step link stitch type (see Figure 10.18). In a few cases the sewing thread is doubled in the first and last quire.

In 20 bindings metal rods (usually brass, see also section 10.5) were found enclosed in the sewing, frequently at the outermost stations, and sewn off flush with the

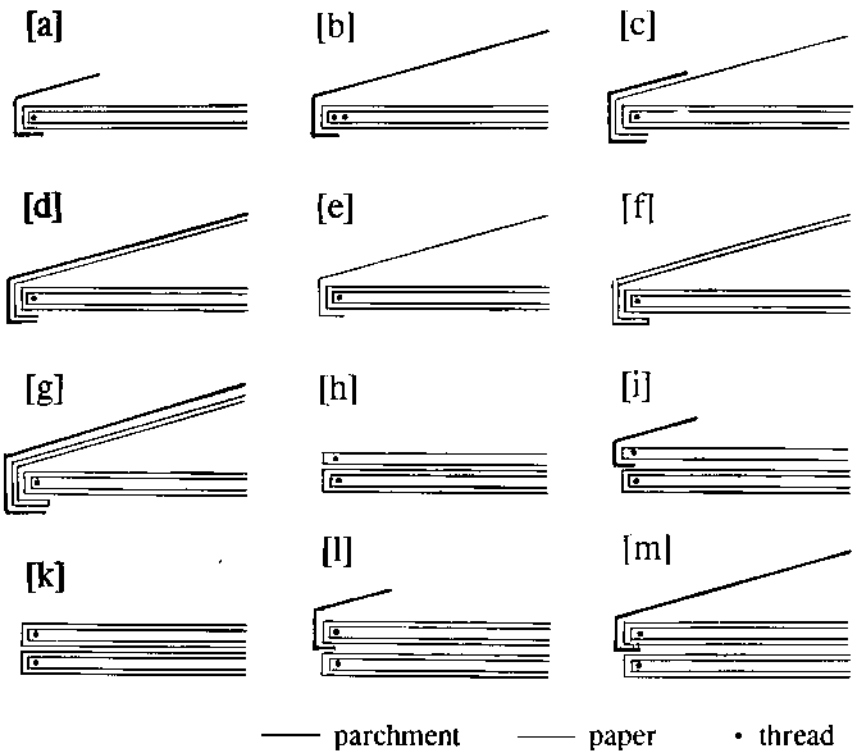


Figure 10.25 Endleaf constructions of limp parchment bindings with cover attachment by secondary tacketing (see section 10.5) and lacing-in the sewing support; [a] to [g], modified outer quires, [h] to [m], added endleaf quires.

spine of the bookblock. The position of the rods varies with the type of thongs used (Figure 10.26). The rods may be placed on top of the thongs [a] or underneath them [b]; with slit thongs or double cords only one part of the support is used [c]; in three instances rolled parchment has been employed as rods, placed on top of single-thong supports [d].

Edges of the bookblock have always been trimmed, indeed often so smoothly that the trimming method is indeterminable; however, in 16 cases score marks are present, in equal parts made by drawknife and plough. It may be pointed out here that the dates of these 16 bindings suggest that during the sixteenth century either tool or method of edge trimming was applied. In about half of the cases the edges show traces of a yellow stain, a few others are blue-green or sprinkled.

Nearly all parchment coverings (plain, but occasionally showing signs of being reused) are attached by lacing in the support slips, in their full width, as shown in Figure 10.26[e]; yet in three cases the support slips are cut in two and each part is laced through the covering, forming a V-shape. These three bindings also have primary embroidered endbands on narrow thongs, which are laced in at the spine edge corners of the covers. Virtually all brown leather sewing supports are now broken, whereas most of the white leather ones are still intact. Front-edge flaps are present on 10 bindings, mostly of square

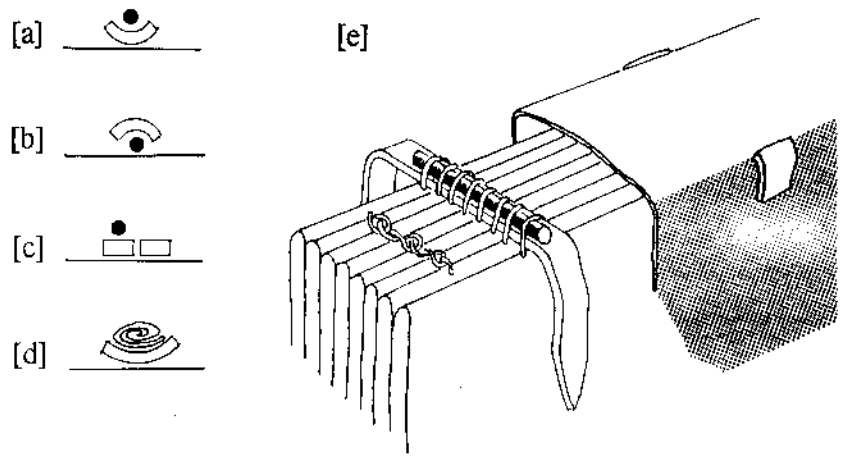


Figure 10.26 The construction of the laced-in covering with reinforcements of the sewing supports: [a], brass rod on top of the thong; [b], brass rod underneath the thong; [c], brass rod sewn with one part of a slit-thong (or double cord) support; [d], rolled parchment on top of the thong; [e], diagram showing the construction with rod of type [a].

and occasionally of triangular shape. Eight coverings are cut flush with the head and tail of the bookblock, 14 extend past the head and tail, but have their front edge turned in, five have a bent type of front edge and seven have all their edges turned in. The spines of the bindings which have the edges turned in all around (among these are the three bindings with laced-in endbands) are slightly rounded (none of these is provided with metal fastenings).

Remnants or unambiguous traces of fastenings have been found on 26 of the bindings studied (4 have clasps, 22 ties of chamois leather). The metal fastenings encountered are of the type shown in Figure 10.19; ties, which evidently have been deliberately cut off, may be anchored in the coverings in a great variety of ways, the most frequent variants of which are depicted in Figure 10.27. The single-slit attachments of the ties of (1) [a] and [b] are eminently weak since probably no adhesive had been used, but remains are nevertheless often extant, like those of the more complex two-slit or three-slit lacing-in systems (2) and (3).

Incorporating metal rods in the sewing, as in limp parchment bindings with secondary tacketing (see section 10.5), was obviously meant to keep the spine flat and to prevent its distortion; in most cases this measure was indeed successful. Yet, two bindings seem to have been subject to vigorous handling by readers who, in an attempt to open the book fully, have bent the rods to such an extent that there is a lasting curve of the spine. Metal rods were not commonly used: out of 192 limp parchment bindings in the Buyk Collection, either with secondary tacketing (see section 10.5) or with the laced-in construction, no more than 24 (12.5 per cent) have metal rods (see note 1). A similar result was yielded for the study of a series of 127 limp parchment bindings of the city accounts of Amsterdam Municipal Archives, where only 10 (dated between 1546 and

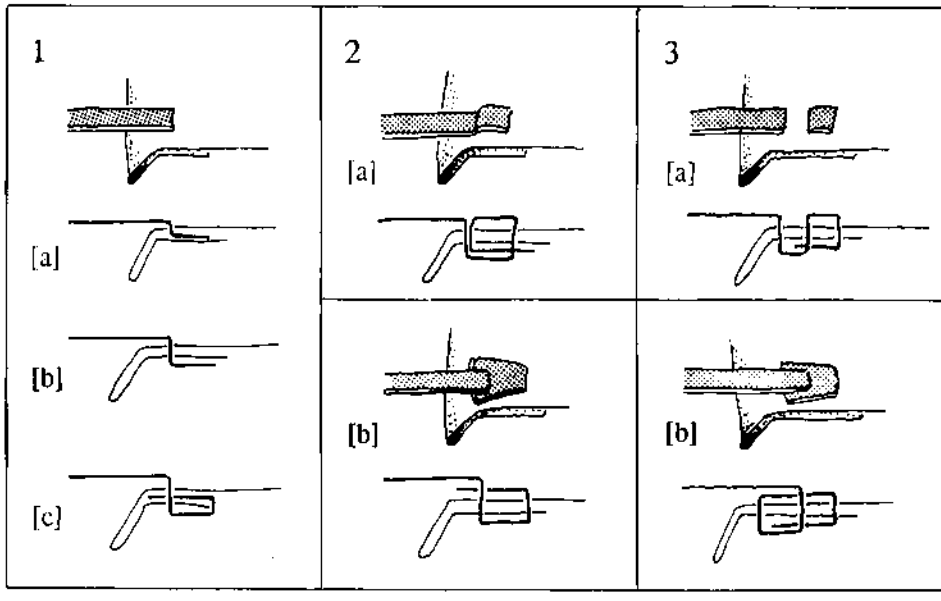


Figure 10.27 Variants of the anchorage of leather ties using one [1a to 1c], two [2a and 2b] or three [3a and 3b] slits in the cover.

1556) were found to have brass rods, which accounts for eight per cent (Amsterdam GA 5014/15-23, 24; see de Valk 1990). Bearman, Krivatsy and Mowery (1992 p. 168) found metal rods on a limp parchment binding on an Antwerp imprint from 1540, which supports the suggestion that the use of metal rods was restricted to the Low Countries and Rhineland/Westphalia (Gnirrep and Szirmai 1989). Metal rods were found to have been applied in various ways (see Figure 10.26), which could prove that they had not just been the practice of a particular binder or bindery; they have even been tentatively replaced by other rigid structures: the Buyk Collection holds three Dutch laced-in limp parchment bindings of virtually identical make-up and with the same unusual method of reinforcement of rolled parchment (Amsterdam UB 248 F 16, 264 G 23 and 470 F 36, see Figure 10.26[d]).

Just as the presence of metal rods in the sewing seems to have been restricted to a certain geographical area, other traits of laced-in limp parchment bindings can pinpoint their origin to a certain region or a given period. In Italy, where this type of limp parchment binding was widely used both for library and archival material, the sewing supports are almost exclusively of white leather and increasingly of the single type. Characteristically their plain primary endbands have a back bead and the laced-in endband slips are often the only means of attachment between the covering and the bookblock, the slips of the main supports having been cut off (Figure 10.28). Schunke (1962 vol. 1, pp. 264ff.) assumes that this attachment is characteristic of Italian and French bindings, as opposed to those of German origin which often have no endbands, the cover attachment relying entirely on the laced-in slips of the main sewing supports.[20] But the more thorough studies of Pickwoad

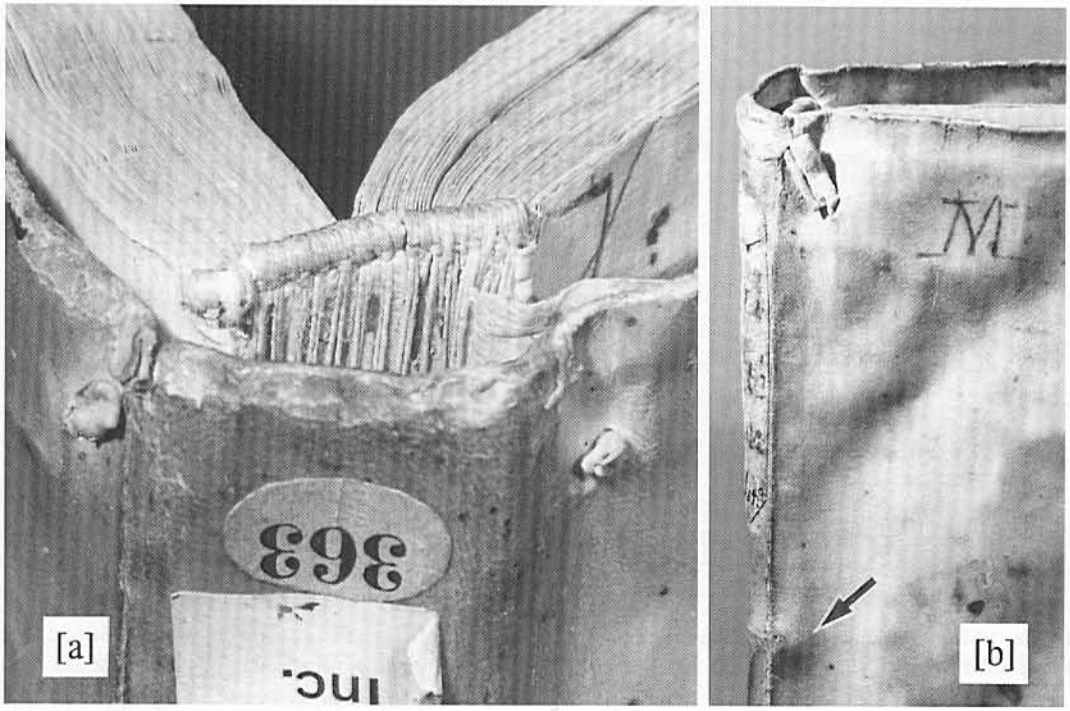


Figure 10.28 Italian limp parchment binding: [a], primary endband with back beads; [b], laced-in single endband support of white leather – the main sewing supports have been cut off, their ends showing a slight protuberance only (arrow); (Amsterdam UB Inc. 363, Venetian imprint of 1557).

(1995) of the Ramey Collection indicate that for the interpretation of such details a closer scrutiny is required. Thus he observed that, in French limp parchment bindings from the 1560s, the slips of the main sewing supports are in fact laced into a pasteboard wrapper enveloping the bookblock; after covering with parchment these lacings become hidden, in contrast to those of the endband supports, and superficial inspection wrongly suggests that this is a weaker structure. Whereas, according to Pickwoad (1995) the presence or absence of endbands in limp parchment bindings around 1500 can be interpreted as an economic indicator (their structural purpose gradually disappearing), their increased appearance towards the second half of the sixteenth century could have been necessitated by a new binding technique. Clearly, many more data on more expanded samples are needed so that we can correctly interpret variants of the limp binding structures.

Before closing this section a few significant features of limp parchment bindings should be mentioned. Lacing-in of the slips of the sewing support appears to have been a secure attachment of the covering as so many limp parchment bindings with this cover attachment have survived the ravages of time in good condition. Limp parchment bindings endured the 1966 flood at Florence Biblioteca Nazionale comparatively well, which has led to the proposal that they should be used as conservation bindings (Clarkson 1975; 1982); the subject has deservedly received much attention during recent decades which has greatly

contributed to a better understanding of what qualities an optimal binding structure requires.[21]

The flexible nature of the cover was apparently one of these qualities, yet it was gradually lost: the laced-in limp covers were a forerunner of the stiff-board parchment binding. This seems to hold for France as apparent from Pickwoad's data (1995) who observed the reinforcement of the covers with pasteboard around 1550, as well as for Italy where Clarkson (1975) observed the gradual change from the limp cover to the semi-limp and stiff-board cover in the course of the sixteenth century. Likewise it holds for evolution in the Netherlands, where the simple flat-back parchment wrappers were gradually replaced by bindings with moderately rounded spines, laced-in endband supports and parchment covers with neat turn-ins and pastedowns. The stiff pasteboards could be inserted at the final stage of the binding process, as one of the two alternative instructions for constructing a parchment binding by De Bray (1658 p. 55) explains.[22] Advantage or not, having received a stiff-board cover the parchment binding prolonged its existence for centuries to come, joining in this respect the leather-covered renaissance bindings. Yet these two differed in an important feature: sewing the bookblock and preparing the whole of the covering were two separate operations, and the parchment binding was a prototype of the case binding.

Finally, the above evolution brought about another significant feature, namely the rounded spine. Whether or not it was the result of a deliberate effort remains just as unclear as in the case of the wooden-board bindings (see Chapter 9); but it was an effective means of providing better stability, and obviously a remedy for the bookblock's tendency to bulge forward, a remedy superior to the rigid stiffeners that had been experimented upon in endless variants for several centuries. Thus the parchment binding with laced-in slips became a worthy companion of the standard stiff-board leather-covered binding; its simplicity, sound construction and durability were features characteristic of the '*reliure hollandaise*', whose praise was eloquently sung by the French binder-poet Lesné (1820, pp. 126, 153).

NOTES

1. Data kindly provided by Kees Gnirrep of Amsterdam Universiteitsbibliotheek.
2. The five limp parchment bindings of Kassel GHB have been the subject of a recent study by Dr Vanessa C. Marshall (1993), who found three of them recently rebound (GBH Th.f. 2, Th.F. 22 and Th.f. 30; her letter of 24 February 1993). My own examination of the five limp parchment bindings at Basle UB revealed that they had all been resewn or repaired to such an extent that the original binding structures have become questionable.
3. The sewing supports of wooden-board bindings served primarily to improve the attachment of the boards to the bookblock and, almost as a consequence, to prevent tearing of the parchment and paper of the quires. In limp bindings, supports are often tacketed or sewn to the outside of the back. These exterior supports serve to prevent damage to the quires and the sewing thread or the tackets; they can further play a role in preventing concave distortion of the spine.
4. The largest part (86) of limp parchment bindings I studied is of Dutch origin and kept in Amsterdam UB (27 of these belonging to the Buyk Collection which formed the subject of an earlier report on metal reinforcements of the spine [Gnirrep and Szirmai 1989]), Leiden UB (7), Nijmegen UB (7), The Hague KB (3),

Zutphen Libr. (3), Zutphen GA (2), Arnhem, Openbare and Gelderse Wetenschappelijke Bibliotheek (1), Liège BG (1) and Utrecht MCC (1). Twenty-six German limp parchment bindings belong to collections of Wolfenbüttel HAB (12), Basle UB (5), St Gall StB (3), Karlsruhe BLB (3), Tübingen UB (2) and Würzburg UB (1). Eight limp parchment bindings are probably of French, Italian, Spanish and English origin and among the holdings of BL, Cambridge UL, The Hague KB, Hereford CL, Shrewsbury School Library and Tübingen UB.

5. Vade-mecums, throw-out sheets bundled by stitching or with rivets, often have limp coverings of leather or textile. They represent a distinct category of limp bindings, dating from the thirteenth to the fifteenth centuries; the earlier ones often contain theological texts (Breviaries), while most of the later ones hold calendars. Their sheets are usually folded two, three or four times, with a triangular tail extension where they are joined. A comprehensive account of the corpus of 50 vade-mecums is given by Gumbert (1994), including the pertinent literature.
6. I owe thanks to Prof. M. Steinmann for kindly examining the covering for me and dating the French script to the end of the ninth century; it originates from a different scriptorium than the tenth-century manuscript.
7. Rule 11 of the 'Instructions for the Librarian of the Charterhouse at Basle' by Georg Carpentarius from *c.* 1520 specifies that new books, 'slender or small', should not be bound until more works were collected (Halphorn 1984).
8. Frederick Bearman kindly drew my attention to this binding.
9. I owe this reference to Jiří Vnouček at Prague Národní knihovna.
10. The Dutch 'Enkhuizer Almanak', renowned for its astronomic forecasts, was first published in 1742, issued in a printed hand-coloured parchment covering (*c.* 90 × 80 mm) attached with a single long-stitch sewing; the latest issue, still with the same sewing structure but in a printed paper covering (*c.* 105 × 80 mm), appeared in 1924 (Amsterdam UB XX 126).
11. Adam's analysis (1910a) was confirmed by Rhein in his unpublished monograph of the 1950s (see Chapter 9, note 2); the fold pattern of the link-stitch sewing as suggested by Rhein is reproduced in H. Petersen (1988 p. 115).
12. This relatively high proportion of metal rods is biased, as the sample was part of a systematic search for metal rods in sixteenth-century bindings (Gnirrep and Szirmai 1989); since then a great many similar bindings have turned up but without metal rods in the sewing.
13. Pickwoad (1994) suggested that on limp parchment bindings with secondary tacketing the slips of the sewing support were purposely left longer for any possible 'future use in a stiff-board or more sophisticated limp parchment binding'. Although Pickwoad's particular examples support his proposition very well, it could not apply to bindings with rigid metal rods inseparably integrated with the sewing, since they would be incompatible with reshaping the spine for a stiff-board binding.
14. My thanks are extended to Idelette van Leeuwen at The Hague KB who drew this binding to my attention and provided me with detailed descriptions and illustrations of its sewing.
15. Whereas in a number of cases remains of tackets indicate that the 'open-backed' binding is an artefact, it is feasible that sewn but uncovered bindings had been sold as semi-finished products; an intriguing example of a sixteenth-century Italian binding without spine covering is given by Bearman, Krivatsy and Mowery (1992 p. 32). However, even in this case the loss of a temporary covering cannot be ruled out (see note 14).
16. This binding was kindly pointed out to me by Prof. J.P. Gumbert at Leiden University.
17. This binding was first noticed by J.G.M. Kienhorst and kindly brought to my attention by Dr J. Storm van Leeuwen at The Hague KB. I owe thanks to Idelette van Leeuwen and Wim J.Th. Smit, both at The Hague KB, for examining this binding and providing me with documentation.
18. The late medieval ledger binding was the predecessor of later types of blank books which called for a particular branch of stationery binding. The tacketed overbands remained in use for external protection until the twentieth century; reinforcing the sewing with additional tacketing with catgut was recommended for blank books until even quite recently (Vaughan 1929 pp. 99ff).
19. Among the earliest examples of laced-in leather coverings are those of three fourteenth-century cartularies from Flanders (Abbey of Baudelo, now in Gent Rijksarchief v° 8, 9 and 10), kindly drawn to my attention by Dr Christian Coppens of Leuven UB. They are sewn on oakwood sticks, prepared prior to sewing by fixing twisted white leather thongs along both sides with a piece of thread; after sewing, the bookblock was attached by lacing the slips through the limp brown leather covering. While visiting the Ludwigsburg Institut für Erhaltung von Archiv- und Bibliotheksgut in November 1996, I have seen a series of account books from Ulm, dating from 1588 to 1712 (now Ludwigsburg Staatsarchiv B 96/13), with either parchment or brown leather limp or semi-rigid covering, with the bookblock attached by lacing the slips of the white leather sewing

supports. Since the volumes are destined to receive conservation bindings, one eagerly awaits the publication of the rare original binding structure.

20. Schunke (1962) provided a complete catalogue of the bindings in the Palatina Collection of the Vatican Library, which in 1623 had come as enemy booty from Heidelberg to Rome. In order to reduce the weight of the 184 chests, many of the bindings were stripped and the heavy wooden boards left behind. About 700 volumes of a total of over 8000 (mostly of German origin) are parchment bindings, but the scant data do not allow for any estimate of the number of limp bindings; moreover and rather awkwardly, several different types of parchment bindings have been put under the general and inappropriate term of '*Steifbroschur*'; possibly some stripped volumes received a limp parchment binding of Italian style.
21. Christopher Clarkson, who pioneered the use of sound binding structures in book conservation, devoted a two-volume study to limp parchment bindings ('Limp Vellum Binding', Typescript, The Library of Congress, Washington, 1975), which unfortunately is still unpublished.
22. Faust (1612 pp. 55ff.) describes in detail the construction of a parchment binding which the editors erroneously have taken as a limp binding. The misunderstanding of the Flemish term 'papierenbert' [paper board] had led to the statement '*Il s'agit ici non pas des ais proprement dites (les cartons), mais des gardes* [. . .]' (p. 56, note 47) and the interpretation of the structure as being a '*reliure en parchment souple*' (pp. 117–120); see Szirmai (1991b).

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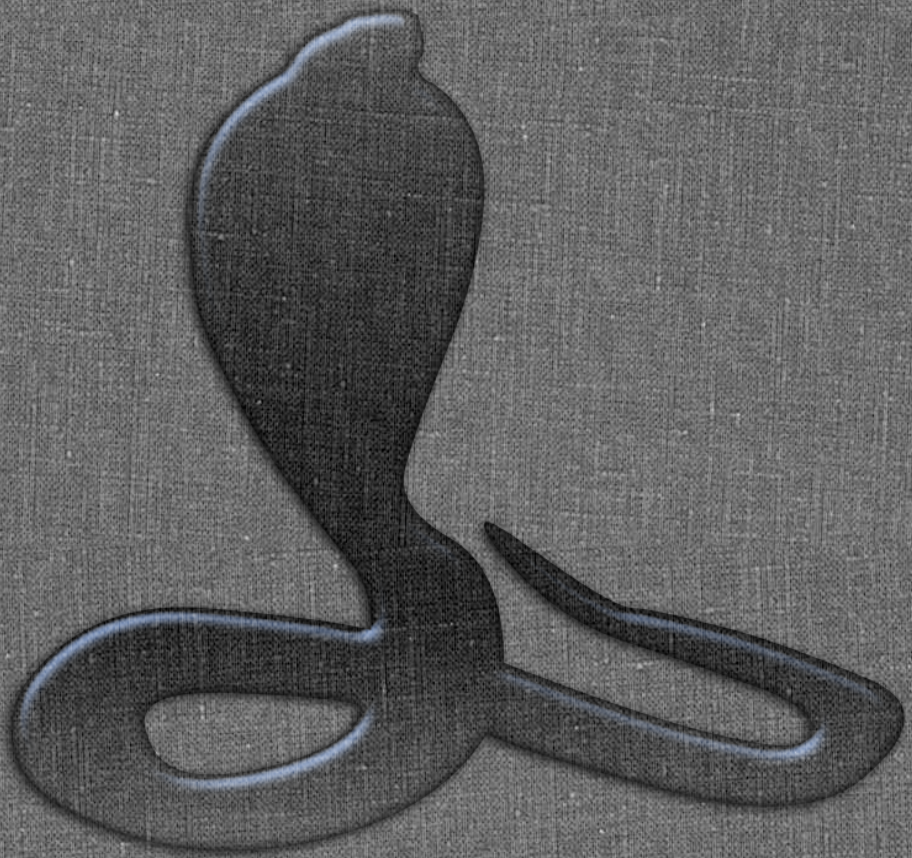

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