English Fifteenth Century Book Structures

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Acknowledgements

It is impossible to thank all of those people who have offered help and advice over the past seven years of my research. However, I know that those who are not mentioned will understand the need for brevity.

First, I would like to thank Francis Hookham who has somehow managed to organise my computer skills; there can be no doubt that without his support and advice these findings would never have reached fruition. He is also responsible for introducing me to the very exacting skills of Dr. Raymond Kelly who, at short notice, provided some critical proof reading.

My understanding of book structures has grown over many years, and there are three mentors who must not go without mention. Christopher Clarkson was my tutor at West Dean College from 1987 to 1989. I am immensely grateful to Christopher for his generosity in teaching a subject of which he is the contemporary pioneer. From 1984 to 1987, I worked as the Conservation Assistant to the Parker Library whilst Dr. Nicholas Pickwoad was the Consultant, and it was during this time that I learned to appreciate book structures. Professor Raymond Page was the driving force behind the new projects in the Parker Library during the 1980s and early 1990s. He developed a vital centre of study, and actively encouraged those people working there to initiate research on the collections. I owe him a great deal for his encouragement and support.

I would like to thank Cheryl who somehow managed to persuade me to complete this thesis. In addition, I must mention my great friend and colleague Melvin Jefferson, for his interest and support throughout this work. I should also like to thank Professor Robin Alston who patiently acted as my supervisor.

Finally, I should like to thank those librarians and library staff of the many libraries throughout the length and breadth of the country who gave me access to their collections. I am especially grateful to the Fellow and College Librarians in Cambridge, notably those at Pembroke, Gonville and Caius, Jesus, Corpus, Clare, King’s, Peterhouse, Selwyn, Sidney Sussex, Queens’, Trinity, Trinity Hall, Newnham and of the University Library.
ERRATA

p.3, line 2 for "it's" read "its"

p.11, line 7 for "since the most part" read "since for the most part"

p.20, para 3, line 10 for "interpretation" read "interpretation"

p.25, line 2 from foot for "a opposed" read "as opposed"

p.33, para 3 line 5 for "James" read "James" 1895

p.35 para 2 for "Surtees" read "Surtees 1903"

p.36, footnote 11 for "Thorold Rogers" read "Thorold Rogers"

p.37 line 12 for "Barker a,b" read "Barker"

p.46 footnote 18 appears on page 47

p.48 footnote 19 for "books often been" read "books have often been"

p.52, para 2 for "phenomena" read "phenomenon"

p.54, line 11 for "the the main" read "the main"

p.55, para 2, line 4 for "style would" read "style - it would"

p.58, footnote 26 for "1995" read "1992"

p.69, line 5 for "its ready loss of" read "its ready loss of grain surface an"

p.79, line 13 for "and are partly homiletic" read "and partly homiletic"

p.81, line 4 for "ancestor" read "descendent"

p.92, line 3 for "book" read "books"

p.94, footnote 53 for "reeked" read "wreaked"

p.95, line 13 for "production from type analysis" read "production involves assessment of type analysis"

p.115, line 3 for "Oxford London" read "Oxford and London"

p.125, line 7 for "or" read "but"

p.132, footnote 76 for "reinforcement's" read "reinforcement's"

p.150, footnote 92 should read: Knifing of the quires of hand sewn books was largely replaced by "sawing-in" in the post medieval period, and in the later period is commonly associated with recessed cord work particularly from the eighteenth century and onwards.

p.176, line 3 for "use" read "used"

p.178, line 13 for "entire fifteenth century." read "entire fifteenth century it is in the last quarter that the most significant changes occurred."
p.188 The statistics on endbands total 112% because the 12% of covered endbands cannot be structurally assessed because they are not visible.

p.205 Diagrams described in terms of short / cushioned and short / chamfered delete /.

p.211, para 2, line 1 for "have" read "has".

p.239, footnote 153 for "phenomena" read "phenomenon".

p.243, line 4, delete (see footnote 150).

p.250, footnote 162, line 6, for "result scholars" read "result of scholars".

p.254, line 3 for "construction fifteenth" read "construction of fifteenth".

p.256, line 7 for "Rhamus Cathartica" read "Rhamus cathartica".

  second line from foot of page delete "(see footnote 39 on woad)"

p.265, para 3, line 6 for "(N.J. Barker / Fishtail Binder)" read "(this book is in the private collection of N.J. Barker, and is in unusually well preserved original condition)"

p.280, line 1 for "complementary" read "complimentary".

p.284, para 2, line 4 for "book much the same" read "book was much the same".

p.290, para 2, line 6 for "played in the binding" read "played a significant role in the binding of some".

p.294, line 22 for "ever ever" read "ever".

p.297, para 2, line 11: delete "(Footnote 135)"

p.301, line 4 for "routed" read "rooted".
Abstract

In discussing fifteenth century book structures the thesis describes those collections from which it's survey (of over three hundred bindings) was drawn. It explores the physical archaeology of the book, and considers the context of book production in the late medieval period. The technical skills of the bookbinder are considered in detail, as are the tools, materials and technologies used.

The demise of the wooden boarded medieval book is compared with the great age of Romanesque bookbinding. In focusing on the collections held by Cambridge libraries, it was inevitable that there should be a strong concentration on the work of bookbinders from that city, but those from Oxford and London are well represented. The work of a number of provincial binders is also given attention.

Many of the books studied were undergoing conservation work whilst being surveyed, and this has provided much information which would otherwise have never been revealed. In particular it was possible to make a detailed study of sewing techniques, and of the changing materials used in the making of sewings.

Utilising a microcomputer with a powerful spreadsheet programme, the survey of three hundred books explores all aspects of English fifteenth century binding in wooden boards. Each book was catalogued in terms of nearly three hundred questions in computerised format, and the results were turned into graphs for percentage interpretation. In addition every book was recorded on a detailed survey form, supported by photographs, drawings and diagrams to provide as full a set of details as possible. The results were scrutinised to consider the impact of the growing use of paper and of the invention of printing with movable type.

The cultural, social and economic demands of the medieval age are brought together as aspects which influenced the development of the book structure. The way in which books were made and used is considered in depth. The impact of mainstream historical developments in politics, religion and education are also factors which played a vital role in the history of the book during this period. The codex (in original condition) is a "time capsule", to quote Christopher Clarkson, and this research seeks to explore book production in one of the most vital centuries of its history.

Nicholas Hadgraft, July 1997
The terms used in this thesis are described in the footnotes and in the text. Terminology is also tackled with diagrams in the second volume, and illustrated with photographs.

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Chapter 1

English Fifteenth Century Bookbindings

Introduction

Epitome

The main theme of the thesis and central to its aim is the clear and full description of the fifteenth century English book and the changes that it underwent in the context of late medieval book production. Does this period represent an "Indian summer" (i.e. a continuation of the medieval tradition) or a spontaneous reaction of radical innovation determined by changing circumstances?

The first chapter sets out the methodology and criteria employed and describes the sources of the books surveyed. The second attempts to place the fifteenth century book in context by comparing the late medieval structure with the Romanesque. The third chapter discusses book production in fifteenth century England and explores the general context in which they were produced, by and for whom, at which centres, at what price and so on. The fourth chapter provides a full description of the fifteenth century book structure in terms of its physical details. The fifth chapter examines the tools used in the making of bookbindings, the marks and traces made by specific tools and what these reveal of the techniques involved in the making of the bindings. The sixth chapter explores the underlying trends in the structural development of English wood boarded bindings of the late medieval period.

The majority of the books surveyed for this thesis were originally made for working libraries, but a number were commissioned by individual patrons - and these too are given attention. The survey does not concern itself with
the remarkable and diverse limp vellum format or with limp and semi-limp structures, although for exceptional reasons (which are obvious when the books are mentioned) a few unusual and important bindings are described to illustrate other features. The survey also examines earlier books which were rebound or radically altered in the fifteenth century. Books were made for a variety of purposes, (i.e. ecclesiastical, devotional, and secular - those which embody the world of learning). We therefore find a wide range of texts such as almanacs, sermons, unique and unusual texts as well as numerous examples of everyday and comparatively common books (e.g. Books of Hours). Were these bound in different ways?

Different craft activities overlapped. The status of the craftsman throughout the period varied according to the nature of his work, and attention is paid to these changes. Consideration is given to the secularisation of bookbinding from the thirteenth century onwards.

As literacy became more widespread the demand for manuscripts and printed books increased. This in turn had a great effect on the economics of book production. Cheaper and more readily available materials were needed for both the text-block and the binding.

The survey of the books whilst drawing heavily from the Cambridge collections does not deal specifically with Cambridge bindings, and it should be clear from the outset that the thesis concerns itself with English fifteenth century wooden boarded books in general - most of which came from London, Oxford and Cambridge. Bindings from Durham and its environs, Nottingham, from Hereford, Whitby, Bury St. Edmunds, Canterbury and Winchester are documented, and many more.

The sample of books which have computerised records numbers in excess of three hundred, and an additional group of some one hundred and fifty books forms a significant element of the material for the thesis. The computerised data has, for the most part, been interpreted in percentage terms and forms the basis of the statistical support material. The computer records for the surveyed books contain 256 columns of information about
each book. Each column is composed of multiple choice options each providing further cells of data held on a separate database. In total the survey provides background information to the thesis amounting to more than 100,000 cells of information about the structures of the books studied. These can be matched/compared cell by cell to provide comparative data between different bindings and groups of bindings. Because the survey is limited to an in-depth study of wooden boarded books, the sample is more likely to be precise in indicating general trends in English fifteenth century bookbinding, and specifically at the great centres of learning in England.

Computerised survey records: Criteria

The records can be broken down into groups of information. The first twelve fields are devoted to recording the bibliographical details, textual origins, date, place of writing/printing, place of binding and early provenance notes. The second group of fields concerns the make-up of the text-block - material, size, collation, sheet format and calliper. The third group of details concerns endleaf and endleaf construction, date, stub profiles, guarding, pastedowns and preparation. The fourth group deals with the sewing of the text-block in terms of the supports i.e. single/double, size, materials, lacing types, supported kettle-stitches, kettlebands, layout and disposition of sewing supports in relation to the text-block height and so on. Thread is considered in detail, in terms of material, colour, size and dimension. Packing and half-packing of sewing threads and linking of sewing are also factors receiving attention in this area of information, as is the presence of stitching. The fifth group is concerned with the treatment of the edges of the text-block - i.e. whether it is decorated, coloured, polished and titled. The sixth group of fields examines the spine and its treatment - i.e. shape, lining, use of adhesives. The seventh group deals with the endband and its construction - i.e. thread, cores, crowning materials, sewing direction, plaiting, bead, lacing and so on. The eighth group looks at the boards -i.e. materials, shaping, calliper, lining, attachment of straps in recesses/surface and technique i.e. nails/rivets/type. The covering of the binding follows on - exploring the
type of skin used, colour, decoration, adhesives employed, turn-ins, tying up, use of ties and formation of corners. Allied to this ninth set of information are fields which concern the make-up and construction of a chemise, if present. The records explore the use of metal fittings, chains, straps and clasps, catches and catchpins, markers and registers. Lastly comes information which assesses the status of the binding. There is a field for general and special information, allowing additional notes to be stored in the computer record. These do not fall within the remit of the set of standard survey questions. All fields are searchable including that containing general and special notes.¹

The Sample of three hundred books surveyed & the fifteenth century college libraries of Cambridge

Amongst the most important manuscript collections with fifteenth century bookbindings in Cambridge are those at Gonville and Caius College and at Pembroke College. These two collections contain the largest numbers of books with original bookbinding feature many of which are untouched. The collections of a number of other colleges provided much unique and very detailed information because many were undergoing conservation work, which allowed unparalleled access to the book structures. Because of the conservation works the smaller collections at Jesus College, Trinity Hall, King's College, Queens' College, Selwyn College and Clare College provided very much more information than would normally have been possible. It is therefore necessary to examine the smaller collections as well as the larger ones.

The printed book collections with fifteenth century bindings provide just under one third of the books surveyed. Amongst the most important

¹ I am indebted to Dr. Nicholas Pickwoad for his advice at the outset of the project which enabled me to set up a survey form designed to work with English fifteenth century books, and which was originally compatible with the survey form he had designed for work on later materials. The survey
collections for this information are those owned by Gonville and Caius College, Corpus Christi College, Jesus College and Pembroke College.

The survey also drew upon the collections at Cambridge University Library, The British Library, Hereford Cathedral Library and on books held by Nottingham University Library. Individual books of interest also figure in the survey such as the Whitby Register, now in the possession of Whitby Museum. Since the most part these latter institutions became custodians and/or owners of the books within the last two hundred years, the provenance of books within their holdings is better appreciated (in fifteenth century terms) on an individual rather than a collective basis, because of this the actual collections do not merit historical description.

A considerable number of manuscripts, and a much smaller proportion of printed books, were in the possession of the colleges from a very early date and in some cases they were almost certainly the original owners. The colleges with medieval origins tended to follow the monastic practice in regard to the establishment and supervision of their libraries. The manuscripts in some college collections were held in high regard just as those in monastic libraries, and the controls which governed the consultation and borrowing of books were as rigorous. It is also the case that books were chained in college libraries for the same reasons as those in the monastic setting. The grading of the manuscripts into those which were for reference only (and therefore to be chained in the library) as opposed to those which could be borrowed (and were therefore not chained) by the scholar (in a college setting) was clearly a continuation of library practice from one type of institution to another. This practice demonstrates both the relative importance attached to certain texts in the medieval context and the close relationship between the monastic seats of learning and the foundation of the colleges. It helps, too, to place the books and their bindings in the history of these college libraries.

form used for this thesis however, rapidly developed to suit the specific class of bookbindings examined and has been purpose built.
The Monastic Library and the Monastery's Books

In the late Middle Ages, just as in earlier centuries, books were an essential part of monastic life, and their use in monasteries was not restricted to the library. In this sense the collegiate establishments seem to have been less free about the way in which books were to be used, in part because they had a different function - educational, rather than for religious worship or ceremonial use. In the monastic settings one imagines that the essentially closed nature of the brotherhood may have provided a confidence which (encouraged by the essential need for books on a daily basis) allowed for the widespread use of the artefacts throughout the monastery. Books were needed in the chapel, in the vestry on lecterns, in the infirmary for healing, and for blessings and worship. They were to be found in the cells and lodgings for private devotion, and were read at meal times as a communal activity. The huge antiphonals were used in the chapel, presumably on a lectern, and pontificals were used for ceremonial acts of devotion. The contents of the book explain both their location and function. The provision of breviaries, portiforiums and so forth suggests they were carried around for daily use, a view which is supported by their rugged construction for heavy usage. The missals, graduals and psalters demonstrate that the monastic house was full of books in regular use in many places. Books were used by monks and novices throughout the day. Nevertheless, it is also clear that by the late medieval period the library was an established feature of the monastery.

The monastic library was used for reading and devotional study and it contained those books which were not for lending. Many books were chained and the familiar furniture of the late medieval library would have been present, comprising a lectern at chest height for those standing to read and sometimes a lower lectern served by a built-in bench. No doubt some books would still have been stored in cupboards. The really precious books would however have been kept with other sacred treasures, and some of these used for ceremonial purposes may have had bindings with gold metalwork, precious and semi-precious stones. The library would
contain many copies of the Bible, the works of the Church Fathers, the Glosses on the Saints, Glossed Psalters, Passionals, Pontificals and some earlier materials. It is clear for example that the Anglo-Saxon *Homilies and the Rule of St. Benedict*, dating from the eleventh century, (Corpus Christi College, Cambridge, MS. 178) once belonged to Worcester Priory and was there until the Reformation. Not surprisingly, it remained in everyday use, judging by the glossing of the text (James 1909, p. 414).

Books would have been brought to the monastery by monks from other monasteries, for evangelical purposes, and in certain monasteries they were made on site. Hence, the monastic library contained a mixed collection of manuscripts with many differing qualities in terms of content, value and finish. There would be both illuminated books, and functional books with little or no decoration, and the collection would usually have had mixed origins. However, there can be no doubt that manuscripts made at a monastic centre often predominated in the collections held there, and one has only to look at the Pembroke College manuscripts from Bury St. Edmunds to realise why that group is distinctively of Bury St Edmunds origin. (Interestingly, this applies as much to the bookbindings as it does to the decorative features of the contents on account of the particular style and use of specific binding materials.)

As books ceased to be useful, many of them were taken apart and the materials re-used in bindings, and no doubt other ways. Quite why this occurred in as many cases is not entirely clear, because it is difficult to understand why some books survived and others did not. However, it is important to emphasise that whilst there was undoubtedly a certain reverence for the book monastic collections cannot be regarded as static, or as simply steadily growing. There were undoubtedly losses and decisions

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2 Presumably some of the ceremonial books, such as the Pontificals, would have been brought from the library to be used in ceremonies. Those books
to remove some books. The extensive rebinding programme in the fifteenth century at Bury St. Edmunds casts some interesting light upon the way in which materials were re-used, even suggesting that a fashion in bookbinding, or a fashion in the housing and use, may have influenced the decision to disbind certain thirteenth century bookbindings in order to re-instate them in the fifteenth century style. This evidence is not unique to Bury St. Edmunds and is confirmed by similar findings in other monastic collections. At Gonville and Caius library for example there are a number of early English bindings which were once in monastic collections and which were modified in the fifteenth century. On the Continent the collection at St. Gall Abbey in Switzerland has been studied in detail by J. A. Szirmai, who records major changes and repairs to twelfth and thirteenth century book structures carried out in the fifteenth century (Szirmai 1992 pp. 165-170).

The extent to which books were produced in a non-monastic setting in the earlier medieval period can only be judged from the texts themselves, and the problem does not warrant discussion in this context. However, it is sad to relate that early medieval manuscript bookbindings seem to have survived in any quantity only amongst those from within the monastic libraries, and not amongst the books used outside the monastic library but within the monastery. This severely limits any claims about representative sampling in the medieval period. In the late medieval period the survival rate is better, and many bookbindings survive which belonged to private owners and to educational foundations. The analysis of a sample of fifteenth century books therefore is more representative than an analysis of a sample of earlier medieval books.

The fifteenth century college libraries of Cambridge - establishment and administration

Unfortunately, most of the collections belonging to the oldest foundations of Cambridge have been largely rebound, and establishing a relationship

were often of large format and understanding how they could have been
between the bindings and the early history of the libraries is difficult. The most noteworthy early collection in this context must be that at Peterhouse (now held on deposit at Cambridge University Library). The Peterhouse manuscript collection has been almost entirely rebound, although there are a few notable exceptions which are included in the survey.

In spite of the fact that many of the books have been rebound, some aspects of the early history of the Peterhouse Library require further explanation because this is well-documented, and helps to explain the overall scheme and use of the early college collection. In this respect it is the best case study available in the Cambridge context. The later foundations largely followed the practices of their predecessors and continued to acquire and use books on the same basis as they always had. The post-Reformation benefactors of college libraries bequeathed collections of manuscripts which would not have represented the pre-Dissolution state of learning; and in this respect the gifts of Matthew Parker at Corpus Christi, Mr Man at Jesus College and William Smart at Pembroke obscure the true picture of late medieval learning in the college library. Later gifts have an unfortunate habit of becoming muddled with manuscripts and certain early printed books which had earlier college origins. This is why the early history of the Peterhouse Library is so important and valuable.

In his manuscript catalogue for Peterhouse, M. R. James includes an introduction by J. W. Clark (later expanded by Clark in his monograph *The care of books*, Cambridge University Press, 1901) which describes the monastic and collegiate statutes that established libraries and their administration, and traces the close relationship between the two (James 1899, pp. xvi–xxxii). However, one must not get the impression from this that either Oxford or Cambridge was exclusively clerical in its academic population. J.R. Lander cites the statutes of Magdalen College Oxford as an example of provision for the admission of noblemen's sons as commoners. (This seems to have been a precedent, and allowed the

used in procession is difficult.
admission of fee-paying students to the common life and teaching facilities. Hitherto they had been taught and boarded in privately run halls). The records of New College, Oxford, also provide substantial evidence of the enrolment of young laymen, who do not appear in the university records themselves. Lander suggests that as many as 60% of undergraduates in the fifteenth century may have gone unrecorded by the University, because most of them never graduated or ever intended to do so. From the time of the foundation of recognised University facilities in Oxford, during the early years of the reign of Henry III until some time before the end of the fifteenth century, students were taught Arts courses, whilst others were taught in an almost informal series of schools which existed side by side with the established University (Lander 1974, p. 143). Nevertheless, the statutes of Peterhouse in Cambridge were clearly derived from the monastic format for what appears to be a rather closed community. Not until 1480 were special provision made for the use of books away from the college. Dated 1344, the Statutes outline the following rules:

In order that the books which are the common property of the House, the charters, and the muniments, may be kept in safe custody, we appoint and ordain that an indenture be drawn up of the whole of them in the presence of at least the major part of the scholars, expressing what the books are, and to what faculty they belong; of which indenture one part is to be deposited with the Master, the other with the Deans.

The aforesaid books, charters, and muniments are to be placed in one or more common chests, each having two locks, one key of which shall for greater security be deposited with the Master, the other with the Senior Dean, who shall cause the books to be distributed to those scholars who have need of them, in the manner which has been more fully set forth in the section which treats of the office of the Deans.

The Deans are:

to distribute them (the books) to the scholars in such manner as shall appear to them expedient; and further, they shall if they think proper, make each scholar take an oath that he will not alienate any book so borrowed, but will take all possible care of it, and restore it to the Master and Dean, at the expiration of the appointed time.
The mid-fourteenth century Peterhouse library was stored in chests, and at this stage the collection was small but clearly very highly prized. Whilst there was as yet no annual audit, the Fellows were left under no misapprehension about the importance of returning books within a defined period of time. They were also encouraged to think of the manuscript as a very precious object, which they should protect and safeguard.

The earliest catalogue of the library at Peterhouse dates from 1418, and provides an excellent picture of the early fifteenth century college library. By 1418 the college had acquired 380 volumes. The size of the collection necessitated a different approach to the care of the individual books. It seems clear that the safeguarding of such a valuable asset led to the chaining of many of the more valuable books, and the consequent division of the collection into those which could be lent (libri distribuendi) and those which had to be chained (libri catenati in libraria). The fact that a very much larger proportion of the chained books have survived as opposed to those which were lent, suggests that chaining was a very effective measure. It may be, however, that those books which were lent simply wore out much more quickly. The exact date at which the chaining took place is unknown, but it is clear that by 1418 it had become an accepted practice, and that the idea of two distinct collections - one for reference and one for borrowing - was established and accepted.

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3 See the introduction to the Peterhouse manuscript catalogue.

4 Books were also kept in a large chest at Corpus Christi College, Cambridge, during the fifteenth century, and one such chest of the sixteenth century survives to this day in the college. The lectern style lid appears to have been added later for reading very large folio volumes. The chest has been further altered (probably in the eighteenth century) and lined with zinc possibly for the storage of bread (Photograph 1).
In his essay on the library J. W. Clark assumed that those books representing a given class and which are not included in the Lending Library, such as Astronomy, Arithmetic, Music etc., would be chained for reference - and he concludes, looking at the library as a whole, that 220 were chained and 160 were lent to Fellows. Clark constructs a useful table (James 1899b, p. xxii) of 304 books showing the subjects and numbers of books in their respective classes. This table provides clear evidence of the subjects being studied at Peterhouse in the fourteenth and fifteenth centuries, and it suggests which subjects were accorded a higher significance.

<table>
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<th>CHAINED</th>
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<td>THEOLOGY</td>
<td>61</td>
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<tr>
<td>NATURAL PHILOSOPHY</td>
<td>26</td>
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<tr>
<td>METAPHYSICS</td>
<td>3</td>
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<td>MORAL PHILOSOPHY</td>
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<td>CIVIL LAW</td>
<td>9</td>
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<tr>
<td>CANON LAW</td>
<td>18</td>
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<td>152</td>
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The different classes of books were obvious in terms of their physical arrangement in the library. The early catalogue makes it perfectly clear that the books given by Roger Marchall in 1472 were divided, by the Donor himself, into those to be lent and those to be chained; those which are to be placed in *libraria vestra secretiori*, and, if the Society pleases, in chains (*in
vinculis si vobis videatur); and those which are to be chained in the more open library (ponantur in vincula in apertiori libraria vestra).

The Master, Dr. John Warkworth, was greatly significant in the history of the library, and his gift of 55 books is clear evidence both of his commitment to the library, and of his love of books. He introduced a biennial audit, and in 1480 he presided over the college whilst it enacted or adopted a complex statute, De libris Collegii, (Commiss. Docts. 1.44.). This is translated by Clark as follows:

In the name of God, Amen. As books are the most precious treasure of scholars, concerning which there ought to be the most diligent care and forethought, lest, as heretofore, they fall to decay or be lost, it is hereby appointed, settled, and ordained, by the Master and Fellows of the House or College of S. Peter in Cambridge, that no book which has been chained in the library there shall be taken away from, or removed out of, the library, except by special assent and consent of the Master and all the resident Fellows of the aforesaid College - it being understood that by the resident Fellows a majority of the whole Society is meant.

It is not intended that any book which has been given to the library on condition of being kept perpetually chained therein shall, by virtue of this statute, be on any pretence removed from it, except only when it needs repair.

Every book in the library which is to be selected and distributed shall have certain value set upon it by the Master and two Deans, and indentures shall be drawn up recording the same.

Once in every two years, in the Michaelmas Term, a fresh selection and distribution shall be held of every book which is not chained in the library - the precise day to be fixed by the Master and Senior Dean.

No book so selected and distributed shall pass the night out of College, except by permission of the Master and the President and the other Dean who is not President; provided always that the said book be not kept out of the College for six months in succession.

If it should happen that a given book be not brought in and produced on the aforesaid day of fresh selection and distribution, then the person who is responsible for it shall pay to the Master, or in his absence to the Senior Dean, the full value of the said absent book, under pain of being put out of commons until it be restored.
Every Fellow who is not present on the aforesaid day shall appoint a deputy, who shall be prepared to bring in any books which may have been lent to him, on the day when a fresh distribution is to take place, under pain of being put out of commons.

The statute is effectively self-explanatory, whilst introducing some unusual features of administration: namely - a biennial as opposed to an annual audit making all unchained books available for lending, and finally allowing books to be off the premises for up to six months.

The fifteenth century college library - fixtures and fittings

The library buildings at St. John's College, Jesus College and Peterhouse retain much evidence of their medieval roots, but for a general idea of the physical construction of a fifteenth century college library the most fruitful example is to be found at Queens' College. This follows a design which J. W. Clark describes as the lectern system, which seems the most likely for the design of a fifteenth century college library (Clark 1901, pp. 151-2). The library at Queens' is unique in never having had complete internal refurbishment. The presses have been altered several times, but the evidence of the original fifteenth century desks is reasonably clear, although there are some problems of interpretation. It is also possible to establish the way in which the books were chained in the fifteenth century.

The 1472 library catalogue of Queens' College (compiled by Andrew Docket, the first President and Founder) lists 199 volumes. The room is on the first floor of the north side of the quadrangle and was built in 1448, being the earliest example of vernacular building in Cambridge. The master-builder was Richard Ely, who also started construction of King's College Chapel and was responsible for the contemporary University Library. The dimensions of the room are 44 feet (length) by 20 feet (width), and the room had an East/West aspect with the North windows overlooking a Carmelite friary. The windows are in pairs which are no more than two feet apart. The extant stained glass dates from the fifteenth century but was purchased in 1537 from the friary at the date of its suppression. Oates argues that the internal arrangement was designed around ten two-tier lecterns arranged to stand out from the walls (Oates
1986). Hence, the desks fill the entire area of blank wall between the glazed areas. Sargent has argued that the system of books differed from most known examples of chained libraries, such as those at Trinity Hall and Hereford, in that it was designed for the "reading" of manuscript books laid flat on lecterns (Sargent 1994). However, an examination of the furniture suggests that the books were always intended to be read at an angle. I am sure that she is quite correct in asserting that the room allowed for twenty volumes per double lectern and that this gave the room no more than a consultation capacity of two hundred books at any one time. Whether more could be stored in the library is another question. In 1472 two hundred and seventy items are listed in an inventory by Andrew Docket (the above) (Searle 1864). This reference is cited by Sargent, and leads her to the assertion that the library had reached its full capacity in 1472 (on the grounds that the Docket stated this to be the case).

Only at Trinity Hall, in its Jacobean reconstruction, are there examples of horizontal shelves designed for the support of books for reading flat. The arrangement of the windows is typical of late medieval library architecture, being equidistant in spacing, with six in the South wall and five in the North wall. The glass at Queens' College is clear, but at Jesus College, whilst some are replacements, each light contains the founder's rebus (that of Bishop Alcock) of a cock standing on a globe, holding in its beak a scroll bearing an appropriate text and half of the subject designation shown under its feet. Thus, as the first book presses contained works on Physic, the adjacent window has the word PHI-SICA divided between the two lights.

The desks at Queens' College were 6 feet 6 inches long and the bottom of the ledge was about 3 feet from floor level. The angle of support for the books as they faced the reader was approximately (it varies a little from desk to desk) 35 degrees from the horizontal. There were ten double-faced desks in the central area of the room, and a further four half desks which rested against the end walls. The books lay on a ledge against the angled desk, lower board downwards. The chaining was probably stapled to the
lower board, and was fixed to a bar which ran the length of the desk above the apex of the desk faces.

It seems that the readers would have been seated on separate stools or benches to work on the lower ledge. The Gothic arrangement in the library would have included a second higher ledge for the standing reader. The desks have been radically altered and additional shelves have been added to construct seventeenth and eighteenth century book presses. The extant Renaissance shape of the ends of the presses is a later modification of the straight Gothic vertical line, and this change necessitated altering the feet of the presses in order to balance the width of the foot with the reduced width of the press itself. Hence, whilst one is looking at a structure which has been in continuous existence since the original construction of the library, one should not lose sight of the fact that it has been substantially altered. The carving of the feet to the altered presses makes the original structure a little difficult to interpret. The major Renaissance refashioning of the presses is also suggested by the termination of the grooves, for the book ledges (i.e. the way in which the grooves into which the angled ledges were fitted, are cut abruptly, suggesting that they have been shortened as part of the reshaping and carving of the sixteenth century)\(^5\).

If it is accepted that the furniture is consistent with other medieval examples, the chaining at Queens' is typical of the type of chaining used throughout the Cambridge college collections. The chaining staple marks on books which have long since had their chains removed in most of the Cambridge libraries (Queens' included) seem to suggest consistency. Chaining was undertaken at either the head or the tail of the lower or upper board. The chaining staple was typically cut with iron snips from a copper alloy plate about 1 mm thick and riveted into position as a U-shaped hoop over the board edge. (This method seems to have been in

\(^5\) The best account of the library at Queens' is still that of Burnett Hillman Streeter, and the arrangement suggested by Oates does not seem greatly at odds with his analysis (Streeter 1970, pp. 27-35).
widespread use, for a similar arrangement was found on the Mellish Psalter - which retains its contemporary chain - now deposited at Nottingham University Library, but formerly chained in a local parish church). Those books which rested below the chaining rail were chained at the head, those most frequently consulted were placed upon the upper lectern and were chained at the tail. The locking mechanism for the rails holding the chain ends varied considerably from library to library. The locks at Queens' were removed (probably in the seventeenth century when the first major alteration of the presses occurred) but judging by the dimensions of the wood infilling locating the early locking point, they were modest and small locks. The design of library at Queens' was followed in the Jacobean reconstruction of a medieval library at Trinity Hall, and at this college elaborate locks survive. However their mechanisms seem too elaborate when compared with the surviving evidence at Queens' (i.e. the fixing holes).

Printed Books and the availability of Books in the Late Fifteenth Century

During the fifteenth century the purchase of manuscripts as opposed to printed books was to some extent restricted to a select group of the wealthy. There are no library inventories showing secular ownership of any scale in the second half of the fifteenth century in England (unlike those lists for the great continental collections). The lists of books for Sir John Paston (17 volumes), Thomas Charleton (9 volumes) and John Howard (14 volumes) are insignificant compared to those of the Dukes of Savoy or the Dukes of Burgundy (who in 1467 owned 900 books)(Sutton 1995 p.61-86). Hence, it is difficult to establish what books were being purchased by contemporaries except by tracing the provenance of individual texts. This relies heavily on books which have survived the vagaries of 500 years of turbulent history. Undoubtedly many moderately wealthy individuals would have owned one book, most likely a Book of Hours (judging by the numbers of survivors and the fact that so many were produced for the English market), but they would have had little or no other experience of the
ownership of books in general. This statement was true even in the post 1470 period when the printed book started to appear in some numbers.

A study of the life and work of William Caxton is another useful source of information regarding the availability of texts. It seems that Caxton found texts difficult to obtain, and even went to the lengths of searching the library at Westminster Abbey for suitable manuscripts. There were so many written in Old English and Anglo-Saxon that he was defeated. The problem for Caxton was that the owners of modern exemplars suitable for printing, and the scribes themselves, had to protect their interests from the potential flood of copies, and so they sought to control the printer. Caxton knew that he needed to trade in manuscripts and he also knew that he needed the stationers to work with him in the sale of his product, therefore the piracy of texts would have been a most unsuitable course for him to follow. One imagines that eventually it was the importation of large numbers of printed books which brought about the breach of this control, but until the 1490s there is good evidence that numbers, whilst increasing, had not reached sufficient levels to threaten these informal rules. It is not until the last decade of the fifteenth century or the beginning of the sixteenth century that the printing press really achieves domination over the format of production. It is interesting to note that the abbreviations in bookbinding structures observed in incunabula books become far more radical in the 1490’s.

In simple terms the informal regulation of new texts by their owners (i.e. the scribes and/or stationers) prevented the printing of much contemporary writing, because these works were maintained as manuscripts. The scribes, mercers, illuminators and stationers wished to safeguard their investments either in time (the scribes and other craftsmen involved in producing the manuscript) or in ownership of a rare and popular exemplar (the stationer, author or other owner). The printers complied with this imposed 'management' of the craft because they needed the co-operation of the stationers and scribes for their trade - both for the product of their presses, and for their trade in manuscripts. There is
no evidence to suggest that the printers in England either resented or sought to change the situation. The theory of this self regulation is endorsed by the output of English printing presses in the late fifteenth century. Anne F. Sutton and Livia Visser-Fuchs argue that Caxton's printing of Lydgate's poetry explains how the limited printing of a small proportion of the poet's output seems to have much to do with authorial control (Lydgate died in 1451). This control was exercised through the Stationers when he was alive, and through the owners of exemplars of his work (mainly his friends) after his death (Sutton 1995, pp.65-66). The fact that Lydgate was a Benedictine monk at Bury St Edmunds Abbey, a vibrant centre for book production, is also an important factor in this example of regulation.

By the 1470s the printed book had become a familiar object in England. By 1480 the trade in books was well established and London had become one of the great cosmopolitan centres for the European book-trade. Indeed, it is reasonable to assert that by the mid-1480s a scholar with London connections could obtain, through the stationer, a copy of virtually any printed text providing he was willing to wait. Caxton himself was importing books, and with his bespoke printing activities (in particular for Italian authors) he was able to keep a good selection of books for sale. He could take a continental printed text, translate it into English for his customers and then print from his translation.

The Collections:

In introducing and describing the collections used in this survey it is not possible to do justice to the many special books which have prompted new ideas or refuted previous theories. Nor is it possible to explain fully the significance of some of the major collections which have been brought together with a widely dispersed set of provenances. The choice of the books used was of necessity highly subjective. I hope to define the importance of the English fifteenth century college collection as opposed to the monastic collection.
Pembroke College

The most significant manuscripts with fifteenth century bindings are amongst those which came to the college in the gift of William Smart, Portreeve of Ipswich. In 1599 he gave to Pembroke over one hundred manuscripts which had formerly been in the library of the Abbey at Bury St. Edmunds.

There are two main types of fifteenth century bindings on the Bury St. Edmunds manuscripts. The largest group of fifteenth century bindings with fifteenth century texts originated in the abbey’s precincts, possibly having been bound by lay binders working on commission. The second type of fifteenth century binding is found on earlier manuscripts and was effectively rebound or significantly altered as part of a massive repair exercise. There are also a number of books which exhibit fifteenth century features, having been altered or partially repaired during the fifteenth century.

The Pembroke College, Bury St. Edmunds manuscripts were part of a monastic library and not a college collection in spite of the fact that some books came to the college much earlier. The Bury books are important, because their provenance is well-established, and because they are so localised. It is therefore possible to observe common practices on different bookbindings which raises the question whether these books are the work of the same shop, if not the work of the same bookbinder. Those manuscripts within the survey which have been identified as having Bury St. Edmunds provenance are: MSS. 69, 85, 70, 89, 98, 109, 110. These provide good evidence of fifteenth century bookbindings in a monastic

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6 It is, of course, entirely possible that books were brought to the abbey as gifts, in the fifteenth century and earlier, from other monasteries. The medieval libraries throughout Europe included many books written and bound elsewhere. However, a large number of the books examined for this survey were identified as having bindings and texts from Bury St Edmunds.
centre, and which may have been executed by lay binders working for and possibly in the abbey.

A number of books were donated to Pembroke College by individuals in the fourteenth and fifteenth centuries, and more commonly in later centuries. The early donations are very important, because they enable the bookbindings to be accurately placed. For example, MSS. 175, and 242 were both given by Joh. Norwich (1381-3), which means that they were in the college library before the fifteenth century, and yet they both have fifteenth century bindings and attendant provenance details. It seems reasonable to conclude that these are bindings commissioned by the college and must therefore be Cambridge work. The same argument applies to the donation of MS. 252 by Ric. Dunmow (circa. 1390). The gift of MS. 209 by Westhagh (Soc.1432) places the manuscript in the collection at an early date, and helps with the analysis of the chaining staple marks on Pembroke books by suggesting the likely format in the fifteenth century. This is useful when examining the chaining marks from later donations such as those of the Bury books given by Smart in the later sixteenth century. An understanding of the chaining marks is further assisted by the gift of Hugo Damlet (Master 1447-50) of MSS. 184, 185, 186.

Gonville and Caius

The collection at Gonville and Caius College is composed of a number of smaller benefactions rather than single large gifts such as that of William Smart at Pembroke. The Caius collection is particularly important in the history of late medieval bindings because of the early provenance of many of the manuscripts. A number of the donors were Fellows of the college and are well documented.

Perhaps the most important benefactor in the fifteenth century was Roger Marchall, whose name appears in the collections of a number of other colleges (notably Peterhouse, Pembroke and King's). The very obvious Cambridge link between Marchall and the books in all the colleges, strongly suggests that his books are in Cambridge bindings. Marchall was a
significant collector and user of manuscripts. Professor Linda Voigts has identified 43 used and most probably owned by him; 6 with possible Marchall association; 12 Marchall manuscripts which cannot be traced, and a further 4 which were formerly connected with him but which have now been rejected as Marchall codices. There are 18 surviving manuscripts at Gonville and Caius which are probably Marchall books with fifteenth century bindings, and these were studied in detail because they are datable and of likely Cambridge origin.

The survey includes a number of books from the gifts of Walter Crome (Vicar of St Peter's, Colchester in 1432), John Beverley (see Venn 1.6), William Grene (Doctor of Theology, Gonville (sic) Hall), and John Cranewys (Sicrist at Bury Abbey in the fifteenth century).

Early donations to the collection include a number of fourteenth century benefactors, and as with the early Pembroke donations these can be valuable reference points in the collection. The gifts of Walter Elveden, Michael Causton date from the fourteenth century. Perhaps the earliest gifts were those made by Bishop Bateman in the mid-fourteenth century, and those given by John of Terrington, “one of the original staff of Fellows”, in 1351.

The gifts of John Argentein D.D. and M.D., Provost of King's College 1501-1507, and Physician to Arthur, Prince of Wales are also very significant. Argentein was buried in King's Chapel and his books may have been bound in Cambridge.

Books surveyed at Gonville and Caius and still retaining fifteenth century binding evidence:

- Walter Elveden - MS. 115.184
- Roger Marshall - MS. 507.385, MS. 79.161, MS. 467.574
- John Cranewys - MS. 113.182
The very large benefaction of William Moore (150 manuscripts) is far too late to provide any evidence for the localisation of the codices in a collective sense, and one must look to the monastic provenance within the group to find helpful information on individual books.

Jesus College

A large group of the manuscripts at Jesus College arrived in the last quarter of the seventeenth century. The manuscripts were given by Thomas Man (B.A. 1674, M.A. 1678, M.D. 1687) who was a Fellow of the College, and Vicar of Northallerton. He gave more than fifty manuscripts, most of which came from Durham Priory. His collection represents what was available on the book market after the Civil War, and the whole collection is focused on the North of England. In addition to Durham, there are manuscripts from Hexham, Rievaulx and Kirkstall.

The Jesus College manuscripts have been extensively refurbished over the centuries and much, now degraded, patching and recovering occurred during the eighteenth and nineteenth centuries. Recent conservation work has provided immensely valuable information about the original book structures which survive under the later repairs. It is the archaeological technique which has identified this collection as an important source on English fifteenth century book structures7. The Man

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7 The use of the word archaeological is appropriate, for this thesis concerns itself with the physical construction of the codex, and employs archaeological techniques to analyse and record methods of construction.
collection reveals northern provincial binding techniques (focused upon Durham) and adds a useful dimension to the survey as a whole. It is work which follows the established practices of the fifteenth century binder (i.e. in lacing paths, board cushioning and so on) but it lacks the subtlety and finish of the late fifteenth century work found in London, Oxford and Cambridge. The collection includes some books which have a traditional structure owing more to the earlier medieval period than to the innovations of the later fifteenth century, and in a structural sense these are better bound than the more sophisticated bindings of the south.

The opportunity to study such a large group of sewing structures in one collection of books provided excellent information about the occurrence and survival of linked sewing over tawed bands in remoter parts of the country. It also provided evidence of the widespread and general application of certain types of endband construction (in particular primary in flax with triple crowning cores in decorative silk). The opportunity to study materials and the techniques of working them was also of great importance to this study. The quality of oak used in making boards could

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8 In this context one is thinking of Jesus College MS. Q. A. 13, a book of sermons, which is in original condition and shows the Gothic style of bookbinding at its best. Bound in an age when bookbinding was a secular craft this manuscript exemplifies the best aspects of the conservative tradition in the craft. The boards have been cushioned to provide the binding with an almost classic appearance and the chemise has been made with similar care and craftsmanship.

9 It is not surprising that some practices seem to have survived longer in the centres away from the Oxford, London, Cambridge triangle, and it was the Man collection at Jesus which first suggested this theory. The sewing of books from the collection contains many examples of books with linked sewing, and when the numbers are compared with those at Gonville and Caius, for example, it is clear that different values were operating in this latter collection, with far more instances of all-along sewing. Identifying the location of the binding shop on plain tawed bindings is very difficult, but amongst the Caius collection a number are clearly from Cambridge.
be examined, on timber that was almost certainly from locally felled trees\textsuperscript{10}.

The Jesus College collection also contains a number of early printed books with unique evidence of the work of the tooled stamp binders from Cambridge. This is significantly reinforced by their excellent provenance. There are very fine examples of the work of Cambridge, London and Oxford binders in the latter half of the fifteenth century.

Corpus Christi College, Cambridge

The manuscript collection in the Parker Library at Corpus Christi College has been almost entirely rebound, although there are a few surviving early structures. The survey includes analysis of a large number of books for trace evidence of fifteenth century book structures, and for fragmentary evidence surviving on essentially rebound books (i.e. those books which retain original sewing but which otherwise have a new binding). Some special books are also included from this collection on account of the unique features which they exhibit - for example, MS. 158 has the first known example of an arguably contemporary gilded edge to an English manuscript.

The Corpus Christi College manuscripts are founded upon the 1575 benefaction of Matthew Parker (Archbishop of Canterbury and former Master of Corpus) and their provenance is largely monastic. The entire Corpus collection dates from the sixth to the sixteenth centuries and later. Parker acquired most of his medieval manuscripts by Order of the Privy

\textsuperscript{10} The likelihood of timber being locally felled and used is clear from the contracts issued to builders, who were sometimes paid to cart timber from ports to the site of use. In other cases payment is specified for the felling and preparation of timber on-site. The reason for purchasing imported boards was almost certainly on account of its higher quality and state of preparation. It is well known that in building much unseasoned wood was often used, for reasons to do with the ease of working. The imported timber arrived in flat sawn boards and the records for its import are well-documented. (Salzman 1967).
Council. Most of his collection came from comparatively recent owners who had obtained them following the break up of the monastic libraries at the time of the Reformation.

The Corpus manuscripts also contain a number of utilitarian working texts for use in the college, and these provide useful evidence about rudimentary sewing structures to paper text-blocks on fifteenth century working books. There is also much collational data of value.

The most important collection of fifteenth century English bookbindings at Corpus is to be found in the Early Printed Book collection. The collection includes examples of most of the binders whose names are derived from the blind tooling on their covers. The work of the following binders is to be found in this single collection (again largely the gift of Matthew Parker), retaining the fanciful names given them by G. D. Hobson and Basil Oldham:

Demon Binder  Huntsman Binder  Caxton Binder
Octagonal Rose Binder  Dragon Binder  Unicorn Binder
Monster Binder  Binder D  Lily Binder
Scales Binder  Binder E  Half-stamp Binder
W. G. & I. G. Binder  Lattice Binder

The work of J. Basil Oldham and of G. D. Hobson, with the more recent work of Howard Nixon and of Mirjam Foot, has placed many of these bindings in either London, Oxford or Cambridge. The Corpus collection is therefore an excellent source for the study of the three great centres of bookbinding in the late fifteenth century. The books have been the focus of a major conservation project over the last few years, making this collection a major source of information for research into fifteenth century English bookbinding structures.

There are also a number of unidentified fifteenth century bookbindings in the Parker Library collection. A few books are not of Parkerian origin, and
in these cases it is sometimes possible to trace the provenance back to an original owner. The Master of Corpus - Thomas Cosyn - is but one example. He was the donor to the college of examples of the Dragon binder's work which is unusual.

Sidney Sussex College

The collection of manuscripts and printed books at Sidney Sussex has some evidence of fifteenth century English bookbindings worthy of mention. One book is especially memorable on account of the magnificent heavy limp tawed cover stained red and blind tooled in a fashion more commonly found on typical late fifteenth century blind tooled bindings with wooden boards. MS. 2, the Statutes and Inventory of Rotherham College, must be one of the most unusual documents in the collection and of its kind. The contemporary cover strongly hints at the manuscript's real function. Namely, that it was a working text rather than a ceremonial book. The two quires of the manuscript were attached to the cover by a continuous sewing between leaves through the cover itself - not as primary tackets.

Archbishop Rotherham bequeathed a number of books to his college (i.e. Rotherham College), and a considerable number of these were printed books. In his preface to the Sidney Sussex manuscript catalogue M. R. James lists six books which were identified by the University Librarian (Mr. F. Jenkinson) as being from this group (James, pp. vii-viii). The significance of the printed books in the Rotherham College collection is their early presence in a fifteenth century collegiate/monastic institution. It is a clear indication that the printed book very quickly obtained broad acceptance by the literate world.

The collection of printed books at Sidney Sussex has been largely rebound, but amongst them there are examples of re-covered items, which to date have not been explored properly.
Clare College

The collection at Clare College provides some useful data, but the provenance for these books is uncertain. The great medieval collection was dispersed, but later benefactors have provided the library with a small group of very fine medieval manuscripts and some exceedingly fine early printed books with contemporary bindings.

There are also a small number of printed books of the fifteenth century with contemporary bindings. One example, Clare College U 5 5, is an important example of blind stamped printed bookbinding by an unknown binder who uses many of the structural techniques employed by the Lily Binder.

King's College

The collection at King's includes one or two very interesting books of great value to our understanding of the relationship between the function of a book and its structure. There is not an entire English fifteenth century bookbinding at King's, but the fragmentary evidence is excellent. Like the medieval library at Clare College the collection at King's was dispersed. M. R. James suggests that the disposal of such a magnificent collection as that at King's College must have had the support of some rather sinister power base - arguably a zealous Reformation Royal authority (James 1895, p. 1).

Queens' College

The collection of fifteenth century material at Queens' College is a small but valuable one. The majority of books at Queens' have a known provenance dating from the sixteenth century, but a number have histories predating this period. Palaeographical evidence also provides additional information relevant to early history and location of origin. Donors include Lady Margaret Roos, Francis Tyndale and Thomas Smith.

The Queens' collection includes the remarkable work of the Scales binder on MS. 13 (Augustini Soliloquias), with decoration which is not
immediately obvious. It also contains the only example of an English fifteenth century bookbinding with elm boards (MS. 16. Horne 28 Graduale ad usum Sarum). The important discovery of half-pack sewing on the Caxton binding in the manuscript collection (MS. 18) was helpful in suggesting an origin for the practice and in establishing how widespread it had become. In addition, there are a small number of early printed books worthy of attention. The most notable decorative discovery at Queens' (by this survey) was the work of the Oxford Fruit and Flower Binder hitherto unrecognised in this collection.

**Material Values - The Scribe and The Bookbinder**

The preceding description of the fifteenth century collegiate library provides some evidence of the high value placed upon manuscripts in the late Middle Ages. The collegiate libraries were based upon the administrative structure of the monastic libraries. The monastic library was a source of inspiration and knowledge for the monks. Books in monasteries shared the same kind of divided status - some were chained and some were not, and some were stored in cupboards in the cloister for use by the monks in their carrells. Descriptions of monastic practice can be found in the Statutes which Lanfranc promulgated for the Benedictines in 1070, and in the Rites of Durham. These works were both based on contemporary monastic practice and provide good evidence for the use and administration of medieval libraries (Surtees , p. 71). It appears that as libraries grew larger so the numbers of unchained books grew in proportion to those chained.

Books were valuable in monetary terms throughout the medieval period. By the fifteenth century, a typical folio family Psalter would cost 20d per quire for writing, £1 5s 10d for illumination and 12s for binding (*Paston Letters 1467*). Parchment would have been an additional cost at about 8d per skin for a mediocre calf skin (Peterhouse MS. 88). These remunerations did not truly reflect the effort and work involved in the book's production, but they are nonetheless substantial sums of money by the standards of the day, when the typical skilled labourer earned
approximately £9 10s per annum\textsuperscript{11}. It is hardly surprising therefore that throughout the century the most likely book to be found in private ownership would have been a Book of Hours, large numbers of which were produced in a wide price range as speculative productions. The ownership of books largely remained the preserve of the wealthy, even after the advent of printing with movable type.

The books studied in the survey were analysed in terms of the structure and decoration employed in their making. Clearly a book sewn on three supports (as with the Corpus example of Oldham's Binder D) is less time consuming than a comparable book on five or six supports. When evidence of this sort was noted in combination with some other evidence of cheaper quality work the binding could be associated with the cheaper end of the market\textsuperscript{12}. Of course this assumes that twentieth century logic may realistically be applied, but in this case the assumption seems reasonable and pragmatic in an objective sense. In the context of blind stamped bindings the elaborate, or otherwise, nature of decoration can also be used as an indicator of expense. The elaborately tooled bindings of the earlier part of the century associated with Canterbury, or those with cut leather work by the London Scales Binder can be associated with the more expensive end of the binding market.

\textsuperscript{11} It has been established that throughout the fifteenth century and to 1539 the daily wage of a skilled labourer was about 6d., and that of an unskilled man about 4d. (History of Agriculture and Prices, Thorold Rogers).

\textsuperscript{12} In the case of Corpus Christi College, Cambridge EP D 1 such evidence provides a useful example of the phenomenon described. The boards were roughly finished with what appears to have been some form of draw-knife. Oldham dates Binder D to around 1485-6, and this would be consistent with a period in which production pressures would have been affecting techniques. The fact that the endband tie-downs did not pass beneath the kettle-stitches at the tail, that the lacing paths were crudely gouged with scant attention to alignment between the boards and sewing supports, that tooling is upside down in places all point towards great haste in production. The use of tanned sewing supports (observed as staining on pastedowns) also suggests a general lack of concern for structure on the part of the bookbinder.
The work of the London Scales Binder is especially significant and interesting to any study of fifteenth century bookbinding. Certain features of his work have been noted on European bindings and these have been used as indicators, rightly or wrongly, of émigré activity. The pink plaited endbands, the clasping from lower to upper board, the use of gesso in the decoration as a highlighting agent, and the different disposition of tooling from one board to the other on the bindings of the Lily Binder, for example, have been suggested as indications of a connection with the Netherlands, leading to the conclusion that he was an émigré (Oldham 1952 p. 29). Oldham’s assertion may well be true for the Lily Binder, but the evidence provided by a study of the Scales Binder proves that such features are not definite proof of a binder’s origin (Barker 1972 a,b). Barker’s compelling evidence for the Scales Binder being English (based upon a complicated and extensively researched assessment of quire signatures and of legal writs) is supported by an examination of the use of cut leather work in general. It is clear that the use of cuir-ciselé in England was very well established by the fifteenth century, and whilst the technique was undoubtedly pioneered in the Germanic world the notion of exclusivity, as implied by early twentieth century historians of bookbinding is wrong. The use of the technique in England from the early medieval period suggests that a long-established tradition already existed. Perhaps it is an example of a revival when it appears on English fifteenth century books, because it is a technique suited to tanned leather and was rare before the fifteenth century on insular bookbindings. In the case of the Scales Binder’s work, it appears to be the adoption of a technique by an accomplished English binder who not only became aware of the potential of decorative cut tooling but also made it his particular speciality.

13 The impression of cuir-ciselé being essentially a German world tradition alone is apparent in the writings of E. P. Goldschmidt 1928 and more recently is demonstrated by implication by Szirmai

14 The general application of cut leather work at this and earlier dates can be seen on a number of artefacts - the examples of some thirteenth century
In the fifteenth century book production had grown considerably, and the commercial scribal manuscript was dominant. There is good documentary evidence in the form of scribal posters from the mid-fourteenth century, but it is clear that secular production commenced earlier. (The first secular binders of whom we have certain knowledge were working at the very beginning of the thirteenth century). There is written evidence of the way in which scribes charged in this period. For example, at Peterhouse a group of six English manuscripts exists with itemised accounts on the endsheets of the manuscripts stating the charges made in production. The large manuscripts are of St Jerome and St Augustine. The costs relate to the writing of the text, the illuminations, the binding and these charges are all cumulated to give a total. Vellum is 3d. a quire for books of under 12 inches in height (MSS. 110, 142, 154, 193 and 198) and 6d a quire for one much larger book (MS. 88). The writing is 16d. a quire for the books in smaller format and 20d. a quire for the bigger manuscript. The binding up of the quires cost 2s. and 2s. 6d., according to size. It is obvious that this must relate to the binding-up of the quires into a text-block for completion by a binder, rather than to the complete task of binding. This provides an

chalice cases can be cited. The cases at Swefling in Suffolk, and at St. Agnes, Cawston, Norfolk (ca. 1373 - 82) are typical. The fine casket at Clare College also demonstrates an adeptness at cuir- cisele work. The casket is lined with a red-dyed skin, and the cut work on the exterior black-dyed leather is possibly of London origin, dating from the fifteenth century. Such artefacts prompt an obvious but imponderable question - could this have been the work of a bookbinder or was it that some other worker in leather and if so whose? It is unlikely to be the work of a saddler whose experience of working in leather is with hide, much heavier than the calf and sheep skins of the bookbinder.

Sadly, Pembroke MS. 204 lost its original binding in the nineteenth century. However, the original tanned sheep cover is kept in an envelope alongside the rebound book at Cambridge University Library. This suggests that the book originally had beech boards (on account of the number of worm holes). There can be little doubt that this is the work of a contemporary or close follower of the Scales Binder. Nicolas Barker recently suggested to me that it may even be by the Scales Binder himself, although he asserts in the Book Collector that it is an "imitation". The binding is important in demonstrating the way in which techniques may have spread from one craftsman to another (Barker 1972).
interesting insight into the way in which some books may have been prepared for the bookbinder.

The signing of the quires in the early medieval period was standard practice and was often preceded by a letter 'Q' (quaternion). By the late Middle Ages production had accelerated so dramatically that in the commercial scribal shop there was a chance of confusing texts, and in the binder's shop probably more so. The widespread introduction of catchwords was a development designed to reduce confusion by all who handled the disbound text-block thereby avoiding the misplacing of quires by those who may in all likelihood have been illiterate.

In the survey the collational signatures in manuscripts (most commonly denoted by a letter and Roman numeral such as ai, aii, aiii, aiv etc. and usually in the tail fore-edge margin), and hand signing in early printed books were carefully monitored to establish any unusual practices. In some cases it can be established which craftsman was signing quires and in which circumstances. For example, in one composite manuscript of two texts, and now in different volumes in eighteenth century bindings, it is possible to see that the quires have been written continuously throughout both manuscripts by the scribe himself\(^\text{15}\) (Corpus MS. 427). The matching of the unusual signatures and the marrying-up of the sewing stations, the supply of modern endleaves at the end of what has become volume 1 and the beginning of (the new) volume 2, constitutes proof that this was conceived as a single volume work. The fact that there are also clear traces of lacing paths from an early binding proves that this was a wooden

\(^{15}\) This fifteenth century manuscript of the works of P. de Ickham, Ric. Cicestrensis and Martin Polonus, is written in the main by a contemporary hand. The quire signatures are continuous from one book to another. The scribe of book 1 fol. 1,2 and other parts of book 1 is also the scribe of book 2. Palaeographical examination suggests that the quire signatures of book 1 and 2 are by the same hand as that for book 2 as previously described. Therefore it seems very likely, that it was this scribe who brought the entire work together for binding, and so we deduce that it was always
boarded book. An understanding of the way in which some books were collated is easier to recognise if the operational stages involved in the binding of the quires is examined.

In the study of signing it is clear that in many cases some texts were independently signed by the scribe and sometimes by scribes, illuminators and others, and this implies not altogether surprisingly that collation occurred repeatedly throughout the making of the book. It also suggests that the different craftsmen chose to check the collation for themselves, and sometimes not very carefully. Thus it is possible to find several signings (sometimes in different colours) in a manuscript with its original fifteenth century binding (Gonville and Caius MS. 56.33). Sometimes a characteristic cross in the centrefold of the quires shows that the quire is complete. This can be observed in both manuscripts and early printed books. Gonville and Caius MS. 56.33 is a fifteenth century manuscript of Reductio morae cum bona tabula, and is written in double columns of 44 lines in a characteristic fifteenth century hand. It was probably bound in Cambridge at the direction of its first owner, Dr. J. Beuerle doctoris (sic), who subsequently bequeathed it to the college. The signatures at the tail fore-edge extremity are in blue, signed i / iii to the centre of the quire. Thereafter, one can see another signing in black which has frequently been trimmed away. The book is richly decorated in blue, red, white, orange and pink with fine pen-work initials. It seems likely that the early signing in blue is possibly associated with the fifteenth century decoration. The signing of books in different colours is not unusual in the fifteenth century, for example Gonville and Caius MS. 334.727 is signed in red and then black in a contemporary continuous signing.

The cost of bookbinding in the fifteenth century is often documented, and this helps us to understand the value placed upon manuscripts. However, bound as one volume of two parts. The sewing holes concur with this opinion, and the texts are all historical and germane to one another.
it is also true that it is usually impossible to marry actual bindings to the existing records, and so it is necessary to try to relate a record to a class of bindings by trying to identify the materials used and by assessing how most books in any given class of manuscript are likely to have been bound. The Paston Letters include reference to the binding of a Psalter in 1467 at a cost of 12 shillings. Here we imagine a plain alum tawed binding perhaps with a chemise, but there can be no proof of this. At the end of the fourteenth century Robert bukebinder (sic) charged York Minster 10 shillings for binding a Gradual for the choir. Some idea of materials costs can also be gleaned from the York Minster records, for he also charged 20d for four skins of parchment for the endsheets and 3s 2d for a deerskin to cover the book. Such a record is useful not simply because it tells us the type of material he was using, but also because it demonstrates that labour was cheap whilst materials were expensive. This picture of cheap labour and expensive materials seems to apply to most aspects of book production from the scribe to the illuminator to the bookbinder. The comparative cost factor is a feature of the history of the book from the late medieval period through to the twentieth century, and has been noted by historians from the nineteenth century onwards.

Methodology and Analysis

The bookbindings studied were analysed and recorded in two ways, and were supported with a large number of photographic records.

1. The written record:

A standard form was designed with a series of general headings which sought to record the books from the inside to the outside (i.e. from the text to the chemise). The single form (see Illustrations - Form 1) developed from its first format to the revised format (see Illustrations - Form 2) after the first year of recording. The reason for the changes arose from the recognition that the materials being analysed were better tackled with separate forms. It was also clear that the first form provided inadequate scope for detailed record keeping. The revised forms also failed to cover all
aspects of the bindings recorded and, like their predecessors, soon became heavily annotated. A decision was taken to persist with the use of the second form because major revision threatened to undermine the previous records and would have made the maintenance of the computerised data very difficult to control. It was recognised that additional notes could be used to overcome any shortcomings with the form structure on an individual basis, and this was made far easier with computerised access via the notes field which to some extent previously relied upon the surveyor's memory.

2. Computer records:

The computers used in the recording of this data were the Apple Macintosh Plus, Apple SE 30, Apple Powerbook 140 and the Apple Quadra 610 (upgraded with 24 megabytes of ram memory and with a 24' screen supported by a Futura II colour graphics card, and with extensive hard disc memory). The essential work is now all carried out on the Quadra because the programme is so large that it cannot be successfully managed on any of the smaller machines. The Excel programme running the fifteenth century bindings records has in excess of 100,000 cells of information, being composed of 317 rows of 254 columns. (Annotated list of columns of data - appendix 4). To the computer, an Epson GT-9000 scanner, operating on Adobe Photoshop, was linked and provided high resolution and magnification images of photographs used in much of the analysis. The scanned images of many of the bindings analysed commonly operate at over 512K per image.

The computer records were generated on Microsoft Office Excel standard spreadsheet format. The analytical work was undertaken on version 4.2, and a number of macros were written which enabled comparative work between columns and between sections of columns. By using macros which could be applied as principles to any set of columns of data it was possible to access all areas without wasting too much time drafting questions in advance. Designing the questions of a generic nature to be applied in this way was a difficult idea to accept and to achieve, but it was
vital and enabled the easy cross-examination of the data at all stages of the research. The key concepts which underlie the basic questions are those of time and place. The information in the macros is sorted by date and/or by location (of binding) and then by any other column or columns in the data. This means, for example, that it is possible to very quickly determine how many books bound in Cambridge between 1450 and 1470 have linked sewing and triple crowning core endbands as compared with those bound in London between 1430 and 1450 which coincidentally have or had a chemise. The final macro used enables this data to be recorded in graph form which is mainly for convenience as a readily understood factual source for better expression in written form.

3. Photographic records:

These were made with three Nikon 35 mm cameras (FA, F301, and F401s). The Nikkor lenses used were of a macro type and were designed for two principal purposes. The 55 mm 1:2.8 lenses were designed for close focussing and with a flat plane lens were ideal for flat surfaces, whereas the 35-105 mm, 1:3.5-4.5 can be used as a zoom but was used in this context principally because it is ideal for working with three dimensional objects. The 55 mm lens on the F401s was an autofocus type which was especially useful in conjunction with the completely automated camera for quick use when under pressure to make images at speed in a library. The films used were normally Kodak Ektachrome in colour slide format, but a number were also made as colour or black and white prints (normally Ilford FP4 was used). The photographs were lit in a number of ways, some were taken by natural light, others by flash (using a dedicated Nikon flash gun) and some were made using reflected light where a softer image was required, and where surface detail was imperative a raking light was employed often with the assistance of a Schott cold light source. In addition some photographs were made in medium format (black and white Ilford FP4/120 roll film) with a Mamiya RB 67 camera, which was linked to four mains-powered portaflash units to provide the finest
textural detail. Where colour slides were made they have been re-photographed on to Kodak Gold ASA 100 print film.

A Sony Video 8 camera (CCD F455E) was also used to make three dimensional working records of specific bindings requiring complex description. This camera was fitted with a 1:1.6/46 F=8.5–68mm lens with macro facility, and with CCD precision autofocus. The images obtained were run through a standard PAL television system, although it would have been possible to have transferred them on to a hard disc and then to have run them through the high resolution colour graphics card and screen on the Apple Quadra computer. Unfortunately, this presented too expensive and time-consuming an option.
Chapter 2
The Evolution of the Fifteenth Century Bookbinding

All aspects of late medieval bookbinding have origins in the monastic tradition of book making. The craftsmanship, the techniques, the skills and even the materials of which books were made had been tried and tested in the monastic setting. Although book making had become a largely secular activity, the monastic tradition may have continued in isolated European monasteries.

In discussing the origins of the fifteenth century bookbinding it seems appropriate to commence with the twelfth century, because the high-point of Romanesque bookbinding (achieved in England just prior to the Norman Conquest) is synchronous with the best structure. The Romanesque binding is the most technically expert and thoughtfully produced book structure in the history of Western manuscript binding prior to the introduction of paper text-blocks. It is a structure which at its best works harmoniously with the quires of the codex, and which operates as a whole three dimensional object with flow and mechanical precision avoiding wear and strain - and it does this in a sense that no other later Western binding structure has ever really achieved. The success of the

16 Abbot John Tritheimius instructed his monks of Spanheim in the year 1486, "after many injunctions against idleness, that he had diminished their labour out of the monastery, lest by working badly they should only add to their sins, and enjoined on them the manual labour of writing and binding books". Urging them to attend to the duty, he said: "It is true that the industry of the printing art, lately, in our day, discovered at Mentz, produces many volumes every day, but it is impossible for us, depressed as we are by poverty, to buy all of them". (British Mag., x. p.128, cited W. S. Brassington, History of the Art of Bookbinding, London, 1894, p. 89)

17 The number of bindings which have survived does not reflect the quality of the original bindings, because so many have been routinely rebound for a variety of reasons (fashion, compilation with other manuscripts, outright destruction with component parts of whole manuscripts being reused and so on). Those manuscripts which have
Romanesque book structure seems to relate to the monastic setting in which it was created. The craftsmen who made Romanesque manuscripts were the pioneers of a distinctive style in all aspects of the book, and as with pioneers in any field, one discovers a profound understanding - which in this case concerns the structural needs of the artefact. Once the craft of bookbinding had become a secularised activity all sorts of other factors intruded on the way in which the work was executed - clerical influences, financial considerations, the spread of fashions and inter-denominational rivalry were some of these factors. It is the monastic environment in which the great Romanesque books were bound and made, rather than the availability of time, which determined the quality of the work. It is the environment which explains how and why the monastic binders were able to develop many original subtleties and a greater profundity in the understanding of structure. The craftsman was still his own master and his skills were probably exercised as an expression of his devotion. In this sense he was striving for a perfection - a feature of the work which gradually became eradicated as crafts became secularised. This is not some romantic notion of the past; it is a recognition of reality based upon an observation of the differences between the care taken in the making of secular bookbindings compared to those made in a monastic setting. The binding of a manuscript was the final stage in its production, and it was the quickest part of book making. In later centuries in a secular context it would doubtless have been regarded as the cheapest stage. In the age of monastic book production it would have been seen as one aspect of an entire process. When secular workshops developed, a binder would quite likely, have seen a completed text-block for the first time after it had been written elsewhere, and he would doubtless have viewed the artefact survived with original twelfth century bindings demonstrate just how excellent a structure was employed during that period. The sewing was substantially formed and the construction is often massive but also finely worked.
in a quite different light. It seems perfectly consistent with the view of books as venerated objects that the making of them in a monastic setting would have been reflected in their manufacture, just as in their subsequent handling and use. In the later period it has been traditionally accepted (from Victorian times onwards) that depictions of the handling of books throughout the Middle Ages indicate a reverence for the word of God. In early pictures the Scriptures are often protected by elaborate chemise bindings, and in later periods the book is held within the garments of the reader (Bearman 1994).

Perhaps the most significant feature of the Romanesque binder's understanding concerns the recognition of the unusual qualities of parchment. The Romanesque binder was fundamentally at home with the material having dealt with nothing else, and he came to it with the full knowledge of its hygroscopic nature, of its irregularities, of its natural features and so on. The fifteenth century craftsman was not able to experience that level of understanding. In the fifteenth century, the impact of paper was fairly well established, and because paper is a totally different material with an even hygroscopic nature and far less variation in the texture and thickness, a new set of values and challenges presented themselves to the binder, who consequently modified techniques to accommodate the changes in text-block materials. The importance of understanding the text-block materials is central to the structural concept of bookbinding. The fifteenth century effectively marks the end of the epoch of English parchment text-block binding. The twelfth century marks its high-point, and in a sense it provides an ideal model for all subsequent binding of parchment. From the sixteenth century onwards with the rapid and universal acceptance of paper for the making of the text-block the craftsman's understanding of the whole binding structure is rapidly lost or at least modified, and before the close of the fifteenth century one can find

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18 This opinion is shared by a number of historians of book structures, but perhaps the principal exponent of the high quality of Romanesque...
parchment manuscripts bound as though they were of paper. Many were being produced by the great workshops of the century, Caxton's shop being one notable exception.

**The English Romanesque Bookbinding and the development of a Gothic style**

The Romanesque bookbinding embodies the idea of parchment leaves held firmly under light pressure between the two platens of an in-built press, i.e. the boards. It is this concept of the binding as a small press which determined the reasoning behind the design - to control the leaves of the text-block, to prevent cockling, to exclude dust and dirt and to protect in a strong structure capable of withstanding day to day usage of the object.

The work of the fifteenth century bookbinder is in marked contrast to that of the twelfth and in a sense the late medieval structure represents a poor relation of its antecedents. This statement suggests that to some extent the thirteenth and fourteenth centuries were transitional. This is not the intention. Rather it is a recognition that the fifteenth century marks the end of a stage in the history of binding which is in contrast with the pioneering work of the twelfth. It is difficult not to view the bindings of the thirteenth century in the shadow of the twelfth, and in doing so to see a gradual but remorseless diminution of a great structural understanding. It was a century in which a secular tradition was founded and developed with a unique identity of its own which in England, at least, has been little researched. There is considerable evidence to suggest that changes occurred in the fourteenth century which have often been associated with the fifteenth - the introduction of greater variation in board shapes, the presence of a variety of endbands and so on\(^{19}\). Bindings from both the bookbinding is Christopher Clarkson.

\(^{19}\) In Chapter 1 it was observed that book structures seen on Continental books often been regarded as indicators of fifteenth century émigré work. There are many fourteenth century examples of plaited tawed endbands in
thirteenth and fourteenth centuries have a unique identity in that the centuries concerned saw the establishment of the secular workshop. The view of the late medieval binding as a poor reflection of previous structures is rather unfair, because at its best the fifteenth century binding still retains the essential understanding of the way in which a binding must physically work with a parchment text-block, and there is far more diversity of structure and technique in the fifteenth century than one might expect. The 'good' fifteenth century binding has far more sound structural qualities than its successors in the sixteenth. The book bindings of the sixteenth century rely far more upon adhesives and abbreviated sewing structures, and these latter changes can be regarded as a response to the significant increase in the numbers of books requiring binding.

Nonetheless, one must not lose sight of the fact that the crucial design features of the artefact were established in the fifteenth century and earlier (i.e. the use of squares, the shaping of the convex spine, the formation of

English monastic collections, and this suggests that the relationship between Continental and English practice pre-dates the introduction of printing by centuries. There should be no surprise in this because there is much evidence of Continental influences upon the making of manuscripts. For example, a study of Norman manuscripts demonstrates that English texts from St. Augustine's Abbey in the post-conquest period were so close in style to those made in Northern France that distinguishing them one from another has presented scholars with a distinct problem, so much so that it is sometimes one of which they are not always aware. (Noted from a lecture given by Michael Gullick, Seminar on the History of the Book, December 1995). The point here, being that the tradition of Anglo/ Norman manuscript production was so closely linked it extended to the making of bindings, and it did not take printing to introduce ideas from the Continent. The conservatism of the craftsman seems more clearly reflected in the individual and national styles used, rather than in rejections of specific constructional techniques. In the fifteenth century, the influence of the humanists also brought a whole new style to the making of some manuscripts, including some of those made in England.

20 Far more research is needed into the structures and developments of the thirteenth and fourteenth centuries, and it is envisaged that this study will move on to those periods in the next few years.
endbands) and the later abbreviation of techniques was to some extent limited by these factors.

It is comparatively easy to give a general description of any type of medieval binding and if one does so, an impression will be given which implies a universality of style - even an approach which seems international. In one sense this may be a helpful suggestion, because it is undoubtedly true that bookbinding as a European craft had travelled far from its Coptic and Egyptian origins and there can be no doubt that structures thought of as being inherently foreign were at one time part of the Western Tradition. It is thought that the multi-quired text-block sewn via chain-stitch was the technique used in the making of early Roman codices, as well as in the making of Byzantine structures (which continued to be sewn in this way into the modern age), and as seen in England in the binding of the late seventh century Stonyhurst Gospels. In this sense a certain uniformity can be described, but only if it is tempered with the certain knowledge that as the craft spread so local practices developed, and individual craftsmen developed their own unique techniques for overcoming problems. Unfortunately, medieval bindings survive in such small numbers that it is often dangerous to make national generalisations or even regional or local ones. In theory, it should be possible to identify bookbinding characteristics as the work of one type or class of binder (i.e. by religious order, locality, secular or monastic and so on). In practice, it is usually very difficult to do this, and certainly before the end of the medieval period it is probably impossible in the English context. In the study of fifteenth century bindings at the centre of this thesis, some books have been identified as coming from a centre, either by locality as with the printed books or by monastery as with some of the Pembroke College collection. In these cases identifiable characteristics have been described. There are many books which are known to be fifteenth century but which cannot be localised.

Undoubtedly there has always been a greater diversity in the craft than is represented by the limited number of examples which have survived the
vagaries of time. It is therefore important that surviving specific and unique examples of the craft are accurately recorded and identified, because it is only in this way that a greater knowledge of what is general and what is special can be understood. In the following assessment of Romanesque binding a group of four manuscripts now at Queens' College, Cambridge and one from Jesus College, Cambridge were assessed in some detail to determine the main representative features of the period. This evidence was further supported by an assessment of selected books from the Bury St. Edmunds collection belonging to Pembroke College. 

Romanesque Bookbindings and Gothic comparisons

Text-block materials and endleaf materials

In the early twelfth century bindings the end-sheets are still integral to the text-block, whereas by the thirteenth century (probably with the introduction of secular work) examples can be found with leaves being added as a separate unit. By the fifteenth century the endleaves are more often than not separate but there are still integral examples. It is not clear what this is telling us, but it may suggest something about the division of labour in the binder's workshop in the later period. Certainly there is no evidence that the separate leaves were added after the main text-block had been sewn because the sewing threads are always continuous. In the late medieval period there are occasional differences between the main sewing of the text-block and that of the end-sheets - hinting that the sewing may have been undertaken in two stages (even to the extent of the end-sheets having a different twist direction from the thread of the main text-block in an undisturbed contemporary binding). In the late medieval period it is not uncommon to find the use of manuscript waste. It is also possible that

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21 The overall approach and general description of the Romanesque binding structure closely follows the approach of Christopher Clarkson. As set out in his article English monastic Bookbinding in the Twelfth Century (Clarkson 1993, pp. 181-200).
the presence of separate endleaves indicates that the manuscript was prepared by the scribe as a bespoke activity (or even as a speculative activity) and was sold as an entity in its own right after production, to be bound after completion with no allowance for endleaves. There can be no doubt that the use of separate ends is a distinctly later phenomenon, which may or may not be associated with the development of a secular trade in manuscripts.

The text-block of the English Romanesque binding is entirely composed of parchment leaves. Determining the animal species of parchment is not always easy, especially when the parchment has been given a distinct nap on both surfaces, but in Romanesque manuscripts it is clear that a sizeable proportion are of calf skin. In the late medieval period there seems to be a larger proportion of manuscripts on sheep parchment, much of which is of mediocre grade. The rapid development of the wool trade in the thirteenth and fourteenth centuries may help to account for this phenomena.

Sewing

In Romanesque bookbinding the text-block is sewn on to slit tawed bands. These are usually of a very heavy nature, that is to say the skin from which they are cut averages 4 mm thickness, and the bands themselves almost regardless of the size of text-block will be in the region of 8 to 12 mm across. In other words, each of the supports created by the slitting of the skin was between 4 mm and 6 mm. Of course some are larger and heavier still, but it is nevertheless striking just how thick and heavy the supports always seem to be, in marked contrast with some later medieval book structures. There seems to be far more attention to detail in this period with much greater care being taken about the slitting of the support itself. In the thirteenth century, with the advent of secular work, one observes a more casual approach, in which supports (clearly slit whilst off the frame) overshoot the thickness of the text-block. In the best Romanesque work this is not the case. The slit corresponds exactly to the dimension of the text-block thickness, implying that the slit was cut whilst
the thong was on the frame. By the early printed period, one can see text-blocks in which the slit extends beyond the sewing at both the upper and lower board, implying that supports were being cut well in advance of being attached to the sewing frame. (A tell-tale sign of the direction of the sewing may be the presence of a slit at one end of the sewing as opposed to solid thong at the other - indicating that the sewing progressed towards the end of the slit but did not reach that far). The supports are always left flat in the early period, just as they were cut, and they are never turned-in (i.e. where one end of the thong has been passed through the slit several times, so causing the supports to spiral into round elements when viewed in cross-section) as is commonly observed in the fifteenth century²². They are never rolled. At Bury St. Edmunds, the tawed supports are frequently of alum tawed calf skin as are the covers.

Throughout the manuscript period books seem to have been sewn from the front to the back. Romanesque bindings observed in Cambridge all seem to have been sewn in this way; in the fifteenth century this more or less holds until the printed book prevailed and a different attitude to the sewing of the book emerged. (This is discussed in more detail in Chapter 3).

The careful sewing of the book with adequate consolidation of the text-block throughout the sewing process contained any tendency to cause swelling of the spine. This action of consolidation as the book is sewn can now be achieved when the spine is worked with sewing consolidation sticks, exerting controlled pressure by a levering action at the sewing edge of the quires as they are added and in between the supports along the length of the spine. There is no contemporary record of this occurring, but the very heavy weight of the threads used for sewing Romanesque books implies that something of the sort must have occurred. This type of consolidation should not be confused with the corrupted form of modern

²² If supports are turned-in there can be little doubt that the thong was slit off the frame.
trade work where consolidation is achieved by striking the spine edges of the quires as they are being sewn (with a weighted stick) because this is potentially bruising and no medieval binder would have employed such a crude technique.

The Romanesque books examined were usually sewn using the herringbone technique. Here the sewing thread drops behind the previous quire’s sewing (1 step) or the previous two quire’s threads (2 step) giving rise to a chevron effect in the primary sewing on the spine (Photograph 2, fifteenth century example). Christopher Clarkson has identified a "family" of sewing which he has termed “helical sewing” in the context of Romanesque bindings (Clarkson 1996). In this sewing, the "the main characteristic is that of a separate thread, worked with one needle, at each sewing station. Each thread winds around its individual band until all the quires are connected. Examples exist utilising two, three or four heavy tawed bands. Seen as a piece of engineering, the twelfth-century helical sewing, with its layers of diagonally latticed wrapping stitches, may indicate a desire to counter a particular problem found with the use of the herringbone sewing types, in which the bands, depending on their substance, are inclined to kink or bend between threads when the book is opened". Clarkson believes that this sewing style was intended to distribute the stresses between the backs of the quires and to provide a controlled opening characteristic, in a more sophisticated and more successful way than is achieved by straightforward pack sewing (this will be discussed in more detail in Chapter 3, but it should be stated that it was first described as "arched" sewing and was discovered by Peter Franck) which is associated with the Italian medieval and early Renaissance period (Franck 1941). Curiously the survey suggests that in the fifteenth century these problems were overlooked during the English manuscript era, when herringbone sewing largely persisted. Only with the advent of the printed book does one see large scale use of pack sewing. Packing existed before the printed book, but is simply not favoured by the fifteenth century English manuscript binder. This discrepancy which may have arisen from techniques introduced by emigré binders (from Italy, the German speaking
world, Flanders, and France) is difficult to explain. It is possible that in England the advantages of the herringbone technique were considered sufficient to make it the only suitable option for the parchment text-block. Alternatively, the difference between the printed paper text-block and the manuscript parchment text-block (the paper text-block tended to be more consistent and generally had slightly thinner quires) made the former better suited to an all-along sewing technique rather than a herringbone one.

All the books of the Romanesque period seem to have been sewn on a sewing frame, although proving this is very difficult - if not impossible. However, given the large format of many of the manuscripts, and the complexity of sewing - either the helical or the herringbone style - would have been very difficult to achieve a satisfactory tension to the sewing thread of the manuscript without some positive supporting tension to the tawed bands themselves at the time of executing the work. Berthe van Regemorter points out that the earliest representation of a sewing frame can be seen in a manuscript of the first half of the twelfth century (Bamberg, Staatsbibliothek, Msc. Patr. 5 {B.II.5}, f.1v) (Regemorter 1992, pp.24-25). Frames may have been more widely introduced considerably earlier with the development of the supported sewing structure.

Book Boards

English Romanesque wooden book boards were always of oak prepared on the quarter. One notices that the boards frequently have a slight wedge shape. The reason for the shape is partly due to the way in which they were cut, and it is probably partly intentional as a structural feature. The boards were quarter cleft, that is to say a froe would have been used to split

\[\text{\footnotesize \textsuperscript{23} The best hope of a solution lies in the evidence provided by the slitting of the supports whilst on the frame but prior to sewing. Because the Romanesque binders were so accurate in working out the length of cut required such evidence is very rare in the early medieval period but by the fifteenth century it is almost predictable.}\]
the timber across the radials\textsuperscript{24}. The effect of this splitting action inevitably leads to a wider area at the circumference of the tree, compared to the more densely packed radials at the centre. Hence it is inevitable that one achieves a piece of wood with a slightly wedged profile. Board edges are sometimes very difficult to assess for a variety of reasons - for example because they are impregnated with dirt, paste or may be covered. It is not acceptable to scrape or clean edges or uncover them for any reason except when conservation work exposes them, and so one must judge the evidence on the basis of what can be seen and suggest rather than assert, what seems to be the case\textsuperscript{25}. It would appear that the thicker edge is placed to the spine of the book, presumably because this edge affords more wood to support the lacing tunnels. The tradition of using the wood with the most recent annual rings to the spine edge is continued into the late medieval period - but for a very different reason.

In the fifteenth century it is not uncommon to find that the more recent wood of a quarter sawn plank has been placed to the spine edge, and in this case it seems to be because of the ease with which it can be squared, drilled and channelled - whereas the harder heart wood, and stronger area of the plank from the core of the trunk, is placed to the fore-edge. It is clear that a very different set of values is operating between the late and early period, because the casual attention to the quality of the timber is in stark contrast to the meticulous preparation of the earlier boards. Twelfth century books with boards which are not properly quartered are highly suspect, and any with inferior timber, such as sap wood, are likely to have been repaired. The inherently conservative perspective of the early craftsman and the obvious pride in his exactitude almost guarantee that his boards will be of

\textsuperscript{24} A froe is a metal wedge for splitting timber.

\textsuperscript{25} Much damage has been caused to bookbindings by research which has involved uncovering or removing parts of the artefact. Even today the lifting of pastedowns as a routine part of scholarly research, continues to be requested. This significantly weakens and damages early book structures,
oak and that they will be of good quality and properly quartered. Quite why this should be is uncertain, because we know that manuscripts varied considerably in quality, and that different grades of parchment were used in their making. Nevertheless, if boards are not of oak one must suspect that the work is not English, and if it is inferior in any way it is probably replaced. None of these latter statements holds true for the late medieval period. Even by the thirteenth century boards were appearing with joins and rough grade timber (Corpus Christi College, Cambridge, MS. 86), and one must consider the possibility that this may have something to do with the secularisation of the craft.

In shaping boards the Romanesque craftsman would sometimes round off the edge of the boards or give them a very narrow edge-chamfer. There are many forms to this shaping, but the overall effect leaves the boards with a rectangular cross-section profile (sometimes still with the aforementioned wedge effect). This, in combination with the lack of any induced rounding (characteristic of later periods), gives the book something of a brick-like shape, which strikes the eye immediately and proclaims the Romanesque status (Photograph 3).

Lacing Techniques

In the earlier period the lacing of the boards to the text-block is markedly different. The emphasis is concerned with the mechanics of the way in which the book operates when in use. The fact that in the twelfth and early thirteenth century the supports are laced in through the edge of the boards demonstrates a profound understanding of the opening characteristics of the codex. In the edge-lacing the boards are brought more directly and intimately into contact with the body of the quires. With the heavy bands and directly sewn end leaves they exert a far greater mechanical influence over the bound quires when the book is opened and read. In the Romanesque period the band-slips of alum tawed skin (which extended

permanently removes aspects of the history of the object and the materials
beyond the spine-edge) were passed through tunnels from the spine-edge of the board and emerge on average 15 mm (this varies according to the scale of the text-block) in from the edge itself, but on the outer face of the board. The tunnels must have been pre-drilled (this could have been executed with a gimlet or a bow drill) and then opened out with a narrow chisel to give a rectangular profile in cross-section. Some have been burned with a heated tool to open the hole further and allow for the heavy bands. The scorching of the entry hole, apparent in some but not all examples studied, seems to be associated with the cauterising of the tunnels so that debris does not block or obscure the act of pulling the slip through the hole. In certain cases it is possible to see an oval shape, and this appears to be two parallel drill holes made flat in the centre by the working of a narrow chisel blade. In the course of the survey, there came to light a number of fifteenth century bindings which demonstrate that tunnelled lacing was not dead by the end of the medieval period (these are discussed in greater detail later). One example comes from the collection of manuscripts at Peterhouse, where the college was most likely the original owner. The examples exhibit characteristics which have been termed by

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26 Szirmai argues that in one case at St. Gall Abbey, a red hot awl was used to make the holes (Carolingian Bindings in the Abbey Library at St. Gall, Making the Medieval Book, ed. Brownrigg, Anderson-Lovelace 1995, p.161) but this seems most unlikely. The heat required to form a sustained hole through the board would be so great that the binder would have had insufficient control to form an even and well-directed tunnel. It seems more likely that Szirmai has seen the evidence of a cauterising tool. Holes made with a gimlet are quite feasible, but they do leave a ragged and untidy hole which would have been cleaned significantly with cauterising.

27 The examples noted were Peterhouse MS. 144, Pembroke MS. 45, and an example reported to me held at the Bodleian Library but not actually seen by me.

Peterhouse MS. 144 is a fourteenth and fifteenth century text of Ps. Chrysostomi opus imperfectum and Homiliae Chrysostomi, in two volumes bound as one, in double columns of 52 lines. The lower endleaves are integral with the text-block, but the upper endleaves are separate. The calf parchment text-block is sewn on six thin sets of double
Christopher Clarkson the "Romanesque Long Lacing Path" although in this instance, the weight of the bands has far more in common with the fifteenth century than with the twelfth (i.e. it is approximately half the weight one would expect for twelfth century lacing and completely fills the channels - without earth-fillers).

In all Romanesque bindings the lacing is of the straight type. That is to say that the tunnels and channels of the lacing follow a straight line at right angles to the spine edge of the board. In the later medieval period there were a number of lacing routes and combinations, some of which were based upon a staggered variation of straight lacing and some which are forked, or a combination of the two (see diagrams in the Appendix - lacing-in). The lacing may be one of two types in the twelfth century supports, herringbone 1 step, from the front to the back; and the supports have been turned-in upon themselves. The book was tied up either side and middle of band after covering. The edges are plain cut and there are no edge squares to the boards. The endbands are sewn in 5zS light coloured flax thread (450 micron) over a twisted tawed core in a complex form without bead and not turned upon itself. The endband cores are laced into the outer face of the boards once. There is no bead and there are tie-downs in every quire under the kettle-stitches and in the endleaves. The secondary endband sewing is in pink silk over three crowning cores. The book has a slight round on closing and there is a sharp 90° joint arising where the endleaves spinefolds have been trapped by the spine edges of the boards. The cushioning is very smooth and has probably been planed and scraped. It is fairly typical fifteenth century cushioning with the board thickness being reduced from 12 mm at the centre to 4 mm at the edges - slightly less at the spine edge. The manuscript had a chemise but this has been lost. The primary cover was of reversed white alum tawed sheep skin of about 1 mm thickness. The spine was probably pasted on covering. The cover was clean and this was its first use. Trimming out was by angled knife cuts and the turn-ins are of consistent medium width. The book was clasped with two upper board recessed fore-edge straps, tawed and stained red, fixed under the primary cover by two domed copper alloy nails. The clasps (now missing) engaged upon two edge-mounted catchplates. The long Norman style lacing is wedged into the board with oak wedges, and the channels are filled with gesso. The double sewing supports are about 6 mm wide. The entry point for the inner board face channelling is slightly staggered alternating between 30 and 40 mm. The inner board face channels are 25 mm long. The oak of the boards has been quarter flat sawn, and may be of imported origin. The binding measures 330 mm ht X 245 mm width X 45 mm thick.
English examples observed: either the "Long Type" or the "Short Type". (Christopher Clarkson has used two sets of terms to describe these lacing paths. The alternative to 'Long' and 'Short' are also useful descriptive terms - 'Long type' or 'Wedged from inner face', 'Short Type' or 'Wedged from outer face'). In the Long Type the tawed band slip travels along the tunnel (about 15 mm average in length for a small folio book) emerging on the outer face of the board and travels in a rectangular channel (cross section and with flat profile, about 25 mm in average length for a small folio book); the channel ends with a re-entry rectangular profile hole and opens into a new channel but this time on the inner face of the board. (The outer and inner face board channels are not always of the same length and are not consciously balanced in this respect). In Short Lacing the path ends with the hole at the end of the outer board face channel. The lacing paths are not staggered as in later book structures, but there is rarely much evidence of damage arising from the regular lacing paths. This suggests that the habit of staggering had more to do with the fashion of increasing the number of bands and with less stable boards, perhaps in circumstances where cushioning had removed some of the additional strength of the wood.

The wedge used to terminate the lacing at the ends of the channels is normally a perfect small wedge of oak - most likely from the same wood source as that for the boards themselves. These fill the width of the rectangular anchor hole. Tawed plugs have also been found, but it is uncertain whether or not these are always original. The use of soft wood in termination holes does not seem to be a part of any medieval tradition (early or late), and where it is seen it is probably due to later repair work.

**Endbands**

The endband lacing systems of the early period are far more significant than those of the late medieval period. The twelfth century endband core was effectively another slit tawed band, which also had to enter the edge of the board. This often made back-cornering of a special early type an essential detail. The fifteenth century endband is still a structural feature of
the bookbinding, but it is a diminutive form of very much slighter weight, and more often than not, it is laced in a very abbreviated fashion - sometimes not at all. In the twelfth century, the endband is a far more prominent working feature of the binding and is usually of very heavy construction, and the lacing of the band follows exactly the same tunnel procedure as that for the main lacing, save that it is angled appropriately to the back cornering of the leaves. Clarkson has speculated on the order in the back cornering of the boards, on the back-cornering of the leaves and on the cutting of the endband lacing tunnel and channel, and upon the sewing of the endband itself. The accommodation of the endband - often at an angle between 35 and 75 degrees to the spine edge - requires great accuracy and judgement if it is to fit accurately as it passes off the text-block and into the angled lacing tunnels. There are many variable factors at play in this structural detail. He suggests that in some cases these operations may have been undertaken with the boards laced to the text-block via the primary bands, and that one would be foolish to take it for granted that they are always sewn before or after the main sewing and lacing had been achieved. The exactness of the fitting of the text-block with the boards and the precision with which the endband core is angled and laced into its tunnel sometimes suggest that a small triangle of the spine corner was cut off with the boards temporarily (at least) laced-on by the primary bands. In these circumstances there is a unity between the core, the lacing paths and the back cornering - suggesting work on a single harmonious unit. He regards such complete bindings as having parts which have "grown up" together. It is certainly true that the late medieval lacing of boards and of endbands is far more casual, and there can be no doubt that such attention to detail was not a part of the late medieval craftsman's approach. Indeed, in the context of the English wooden boarded binding, once the great age of the Romanesque binding has passed, it is this attention to detail which soon falls away, and the quality of the thirteenth century craftsmanship does not match that of the twelfth century in general as well as in this particular detail.
Spine Shape

In cross-section, the spine shape of the Romanesque book is distinctly flat, and any book of this date with another shape must have been altered or repaired later. Even after the introduction of alternative lacing paths in the first half of the thirteenth century, the spines of books remained flat in profile. As late as the fifteenth century it is not uncommon to find manuscripts with a flat profile to the spine, although it is comparatively rare to find a printed book so shaped. Flat spines became rarer as the fifteenth century progressed. The spine shapes of books throughout the medieval period are a natural phenomena of the craft, and it is not until the sixteenth century (in England at least) that one witnesses clear evidence of induced rounding (by which is meant the rounding of the text-block with controlled hammer blows). The flatness of the spine in the twelfth century can be attributed to the fact that whilst the boards were laced on securely, the nature of the parchment, the weight of the sewing supports and the security and substance of the sewing itself held the spine at right angles to the board face creating one integrated working unit.

The careful and tight sewing of the book, with consolidation of the text-block throughout the sewing process ensured a regular slab-like text-block, and led to perfect control of the parchment leaves. It provided the binder with the ideal shape to create the desired pressing effect of the boards upon the unit as a whole. The Romanesque binding is also designed to provide a good but controlled access to the leaves with full opening characteristics. The binding avoids the risk of abrasion damage between the leaves by the security of its very robust sewing structure. This sewing structure by virtue of the weight of its supports and by virtue of its strong and well formed sewing techniques (especially in the case of the helical sewing) also determines the arching of the spine. If the spine opened right back upon itself (as in the earlier unsupported chain-stitch bindings - where the sewing relaxes upon opening) the supports would peak at the point of opening and would be placed under considerable strain leading quite quickly to break-down of the structure.
Board Leverage and Opening Characteristics

The medieval binder (including the later binders) always aimed to create an opening characteristic which was controlled - leading to a flow in the leaves of the text-block. The aim was to give unrestricted access to the whole leaf area when the book was fully open. The binding was designed to operate as one unit so the boards support and exert a slight pull - thus fanning the leaves as they are thrown back to open the book. (This is a vital phenomenon first noticed by Roger Powell and termed by him or Anthony Cains "board leverage"). Board leverage was further analysed and its structural importance emphasised by Christopher Clarkson. With 'board leverage' in mind, he has described the three elements at the joint area which give rise to the phenomenon as being the endleaves, the bands and the cover. Board leverage is profoundly affected by the presence of pastedowns and by the strength and substance of the bands and the cover. The opening characteristics of the medieval book are determined by the mechanical action of the binding arising from the working of the sewing structure and the spine as a whole. This action of the binding affects the shape adopted by the spine, so do the robust nature of the sewing structure and the density of the threads across the spine width arising from the weight of the thread used. The thread, in combination with the weight of the supports and the action of the boards and endleaves, determines the working characteristic of the spine by providing an open shape following a wide curve approaching a semi-circle rather than a fiercely peaking narrow arch.

Tab Endbands and Spine Liners / Spine Treatment

The desire to create a controlled arch in the opening characteristics of the spine was a major concern of the Romanesque binder. The other influence which the binder could introduce to control opening was the linings on the spine of the text-block. Most scholars of books are familiar with the tab endbands seen on Romanesque bookbindings, but these are possibly the most misunderstood features of the structure. These projecting half-moon
shapes at head and tail of the spine have been described as handles with which to grasp the books and so on. In reality, as most if not all of these books had a substantial chemise covering the tabs and the whole vulnerable area at head and tail were covered, such suggestions are really speculations made out of context.

The tab is created by incorporating a tab stiffener with the primary cover of the book and with the primary endband (the stiffener can extend a considerable way down the spine beyond the first and last sewing stations as in the twelfth century binding on Pembroke MS. 15, Photograph 4)\textsuperscript{28}. These can be very complex structures and varied from country to country, but it is the reason for the inclusion of the tab which is of interest. The tab and tab stiffener exerted in combination with the whole endband structure a profound effect upon the opening characteristics of the book. This reinforcement to the spine, held securely in place by the tab sewing and by the endband into which it was incorporated via the tie-downs, helped very significantly to exercise control of the opening characteristics of the spine. Just as in Greek binding, where the unsupported structure is heavily dependant upon the sewn endbands which are actually sewn into the boards themselves, so the Romanesque tab endband bonds all components as they come together at the extremity and most vulnerable working point, to provide a real strength and durability of structure which prevents lateral movement whilst at the same time helping to induce the desired wide circular opening characteristic. Indeed, one cannot help but wonder whether the tab endband is an evolution from the Byzantine tradition of binding?

In English Romanesque work the straightforward tab endband is worked in a thread of roughly the same weight as that for the main sewing, and is usually in two colours. In one of the bindings from Queens' College,

\textsuperscript{28} Note how far down the spine the tab stiffeners extend, raising the primary spine covering at both the head and tail. Note also, the two stations on very heavy supports that the textblock is sewn.
Cambridge (MS. 20) it is possible to see the blue thread which has been used in the sewing of the endband (blue/white) also used for a few quires in the sewing of the text-block itself. There are more elaborate endbands of the twelfth century, often in various colours worked in a chevron pattern, but the general characteristics and effect are the same. Sometimes the protruding tab at head and tail was lined with embroidered silk before the edge sewing incorporated the primary cover, the endband stiffener and the lining. The sewing of the various laminates of the tabs is often in the form of a whip-stitch of coloured thread, but there are many elaborate forms (e.g. braiding in colours) showing a conscious effort to hide the raw edges. The compound endband in England appeared in the twelfth century so the stage at which it was introduced fell probably within the transition at the end of the tab endband period (i.e. within the first half of the thirteenth century). In the fourteenth and fifteenth centuries a parallel concern arose with the problem of incorporating the head and tail of the primary covering material. This was often achieved with the use of a German style plaited endband as a secondary formation after sewing a conventional medieval style endband, or with the formation of a chevron of thread (often of blue and white flax based material) over the endband and cover, or with the formation of a secondary sewing of silk incorporating crowning cores. At the cheapest level this was achieved by simply whipping over the endband and covers with straightforward loops of thread (a form which Michael Gullick reports as being very common in fifteenth century work observed in the library of Hereford Cathedral) (Gullick 1996).

In the late medieval period the tab endband disappeared completely (there are no examples after the mid-thirteenth century), but there are one or two

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29 There is an aesthetic consideration at work in this braiding which leads to a very general appearance not dissimilar to the Greek style sewn endbands, although it is structurally quite different and is probably no more than the coincidence arising from an intention to achieve the same effect on the opening characteristics of the book.
examples of fifteenth century books of very large format which do incorporate independent tawed spine linings (patch type). It seems that the tradition was simply discarded for greater speed of production, and it was superseded by far less complex spine linings simply stuck to the spine, and by a far greater reliance upon rather more straightforward endbands.

The function of the spine liner is quite different in the early medieval period from that found in the late medieval period and beyond. In the twelfth century thin tawed or parchment liners protect the spine folds of the leaves from spine adhesive when the book is being covered, and although there are also examples in the Pembroke and Peterhouse collections of parchment patch liners which appear to be pasted to the spine itself it seems likely that this pasting is part of a later repair which has misunderstood the function of the liner. Such patch-liners were probably originally pasted to the board edges themselves and, after covering, had effectively served their purpose. The practice of using liners for this purpose had not completely died out by the fifteenth century. In the large early fifteenth century Peterhouse volume (MS. 12) the patch liners are loose in the spine, having become completely detached. In MS. 13, the second volume of the set which has a damaged binding, at least one such liner is free and accessible, and it is obvious that the traces of adhesive only appear on the areas of the patch relating to the board edges.

It is not possible that such liners - which are either narrower than the full width of the spine (encompassing only the text-block) or just the width of the spine plus the board thickness - were pasted on to provide spine support. Liners incorporated within the tab were stitched to the stiffener and are of tawed skin, extending between the stiffeners, and are usually attached to the board edges.

In some twelfth century bindings one can detect the presence of full parchment "compound liner and board-sheets" (a term defined by Michael Gullick and first noticed by him in his work cataloguing the manuscript bindings at Hereford Cathedral) where a piece of parchment has been used from the fore-edge of the upper board to the fore-edge of the lower, filling
the entire inner surface of the boards, with slots cut at the spine to accommodate the bands and tab stiffeners (Gullick 1996)\(^30\).

In the fifteenth century binders were pasting patch liners (i.e. patches of parchment the width of the panels between the supports) over the backs of the spine folds and on to the outer board face, extending on average 30 mm on to the face of the board. In these instances, it is clear that the linings are intended to help to stabilise the text-block and control the operation of the spine in terms of its opening characteristics. They also assisted in creating stability in the text-block at the point of sewing and whilst covering endbands, processes which thus occurred after the main lacing on\(^31\). (This is significant, because it tells us that in these instances the

\(^30\) Such features were observed by Christopher Clarkson in the different context of late medieval limp vellum bindings.

A board sheet, of the type described by Gullick, was observed on a wooden boarded fifteenth century binding in the Jesus College collection - (MS. QD7 a text of Boethius). In the absence of tabs and stiffeners it was most likely applied across the full height of the spine with slots for the supports. The manuscript is mixed and contains work of both the thirteenth and fifteenth centuries. The binding is fifteenth century, and there is a commentary by Nicholas Trivet. It was given to the college by Mr. Thomas Mann in the seventeenth century and originated from Durham Priory. Initials are in red and green and there is good English border decoration (i.e. it was always considered a good quality manuscript). The manuscript binding is especially remarkable on account of its apparent pre-cover pastedowns, which may once have constituted a compound liner and board sheet. The manuscript has been rebacked and it is now very difficult to establish the exact nature of the spine linings and pastedowns, but the inference from preliminary investigations is that the damaged pastedowns may be part of a conjugate fold of manuscript waste and that they could once have passed over the spine. The manuscript will be the subject of conservation work in 1996/7 and this may provide conclusive evidence.

The manuscript has been sewn herringbone front to back on four stations over medium slit tawed supports, and was covered in tawed goat skin grainside outermost over very finely-cushioned oak boards (rather open grained and not strictly on the quarter) and in all other respects the binding is typically fifteenth century.

\(^31\) If the tie-downs pass through the liner the liners must have been present prior to sewing.
endbands were probably sewn after the boards had been laced-on, and it
could also help to explain the preference for the classic fifteenth century
lacing style which would almost certainly have been undertaken after the
endband had been sewn\textsuperscript{32}. These liners are surely doing the opposite of
their twelfth century counterparts. The fifteenth century liners were
certainly added after sewing and board attachment, and they often fill
every panel, with the endband tie-downs being frequently sewn through
them after they have been stuck to the spine\textsuperscript{33}.

Primary Covering

In assessing the covering of all medieval manuscripts one has to take
account of the fact that in the majority of cases one is observing the
primary cover naked of the chemise which, in most cases, provided a
secondary covering. This is less true of the fifteenth century book by which
time many bindings in tawed skin clearly had no chemise, as one can see
from books depicted in contemporary paintings. The group of Pembroke
College twelfth century bindings suggests that the predominant covering
material of the time was tawed calf skin. There are doubtless examples of
tawed goat and sheep, and there are many claims for the use of deerskin,
but determining with certainty the animal species of the tawed skin -
when the grain has been effectively distorted with the tensioning of the
covering material - can be very difficult. The group of twelfth century
manuscripts at Queens' College includes three covered in seal skin with
the hair still present (the chemise is made of seal skin rather than the
primary cover). The use of tawed skin is predominant in the covering of
manuscripts in the Romanesque period, and maintains dominance
through to the last quarter of the fifteenth century. By the late Middle Ages

\textsuperscript{32} The classic fifteenth century endband lacing is that which comes over a
short channel on the outer board face and which is secured once by means
of a dowel usually of wood.
the use of tawed sheep skin appears to be dominant. Calf skin was reserved for better work. This will be discussed in more detail for the late medieval period. (The identification of the sheep skin is as reliable as can be reasonably established without sampling. The qualities observed in this material are its general flabby and loose grained nature, its ready loss of example of which is at Corpus Christi College, Cambridge EP-E-10 (Photographs 5)\textsuperscript{34}. Tanned leather is also very occasionally used in combination with tawed skin on bindings throughout the medieval period, but the tanned material rarely has more than a decorative role. For example, it is sometimes used to form a piping as part of the circuit sewing to the chemise (Queens' MS. 18, James 5)\textsuperscript{35}. In the fifteenth century tanned leather is also sometimes used to form the straps attaching clasps, and this feature has been observed in undisturbed bindings covered in tawed skin. Tanned leather was in regular use for covering books at the end of the

\textsuperscript{33} It should not be forgotten that slotted liners were not discontinued. In his analysis of limp vellum bindings, Clarkson noted the presence of full length slotted liners as late as the sixteenth century (Clarkson 1982).

\textsuperscript{34} This is a copy of Aquinas de veritate Cath: Fidei (Venice: Jenson 1480) Gaselee 46. according to G. D. Hobson this and other examples are closely associated with Oxford, to which he ascribes the bindings (Hobson 1929 p.10, plate II). The stylistic similarity between the fifteenth and twelfth century stamps is completely convincing, but the use of twelfth century tools to execute the work seems rather more unlikely. A number of scholars have pointed out the subtle differences to be observed between tools which superficially appear to be the same, notably Graham Pollard in "Some Names" (Pollard 1970). One wonders if these tools were cast from images observed on their bindings. (See Chapter 5 on blind stamped tools in this thesis). EP-E-10 is unremarkable in other respects being sewn all-along (a good early example for the printed book) on the typical four stations over heavy slit tawed supports with a supported kettle-stitch. The use of parchment stays in every quire implies an above average sewing when coupled to the heavy supports and kettle-stitch support. The primary endband core is of cord (slightly unusual) and was laced in true fifteenth century style, once into the outer board face. Boards were cushioned with a cabinet maker's axe and the wood is not truly quarter cut.

\textsuperscript{35} This original twelfth century binding has oak boards covered in seal skin (with the hair on). The edges have tanned calf piping, sewn with a stitch
fifteenth century. Both calf and sheep skins were used, widely and generally in bookbinding. The twelfth century binder had a justifiable distrust of tanned leather and never used it for making sewing supports. This is not so for the fifteenth century English binder once the printed book had become established.

The act of covering the medieval book is essentially the same from the twelfth to the fifteenth century. The primary covering is frequently thin and was probably dampened to encourage close fitting - giving rise to an almost skeletal appearance in some instances. The late Roger Powell argued that when rebinding medieval books the covering should be undertaken with the boards at 90 degrees to the text-block, thus achieving a natural rounding often seen in the Gothic European book. The skin covering was boarded on to the surfaces of the boards themselves, thereby ensuring that the grain of the skin was preserved. In examples of good work, the shape of the spine and the covering of the boards has a very natural look, as though it has "grown" (to use Christopher Clarkson's term). The primary covering of all tawed medieval bindings, when full, seems to be pasted all-over and not simply at the turn-ins as is occasionally suggested. However, there are a few examples of printed books in tanned calf which appear to have been pasted at the turn-in only; this may be for reasons of speed or may have something to do with blind-tooling after covering\textsuperscript{36}.

The turn-ins of the cover were of very mixed dimensions throughout the medieval period. There was no common practice observed, and some of the apparent trimming-out may have occurred in later centuries, but it is clear that in the twelfth century as in the fifteenth, the turn-in width is unpredictable. The most common form of corner in the fifteenth century was the tongue corner, but there are examples of lap corners and of cut

\textsuperscript{36} The binding of Clare College U.5.5 has a covering pasted in this way.
mitre corners. All late medieval corners rely upon adhesive to hold them in place. In some twelfth century books the English sewn fore-edge corner has been noticed, in which the edges of the corner are loosely looped together on the inside and, after covering with the setting of the corner, the threads are pulled tight to sew them together invisibly. (This feature was first recorded by Christopher Clarkson, who subsequently re-introduced it as an aspect of the conservation of Romanesque manuscripts. An example can be seen on Corpus Christi College, Cambridge MS. 294)\textsuperscript{37}.

The fifteenth century bookbinding had become a quite different artefact from the twelfth century one, whilst still owing more to the medieval tradition than to what was about to come.

The Chemise

It seems very likely that most English alum tawed manuscript bindings in the medieval period, including many of those made by secular workshops for non-monastic use, were provided with a chemise. This is as true of the fifteenth century bindings surveyed as it is of those of the earlier periods. However, as with other aspects of medieval bookbinding, there was a tendency to abbreviate details of construction and finish in the later Middle Ages. Such generalisations must be qualified because there are also examples of very fine chemise bindings of a rather different character, which belong to the late medieval period.

In the routine working book, from the twelfth century to the fifteenth century, the chemise is really a secondary covering which envelops the whole text-block including the edges and with few exceptions it is made of tawed skin. The textile chemises of the fifteenth century had a special function and significance and are not classed or considered in this context. In the twelfth century the skin of the chemise was of heavy weight (4 mm

\textsuperscript{37} The binding by Christopher Clarkson was influenced by a twelfth century binding from Reading Abbey which had particularly wide turn-ins and which he had studied in detail whilst working at the Bodleian Library.
thick chemises are not uncommon; this is the weight of the seal skin chemise coverings at Queens' College Cambridge - James MS. 1 and MS. 5) but in the fifteenth century survey some chemises have been noted as light as 1 mm. on very large bindings. (This phenomenon is explained in more detail in Chapter 3).

The cover is held in place by two envelope pockets which are frequently invisibly sewn with a running stitch from the inside. The boards of the book were almost certainly wound back partially behind the text-block and inserted into the pockets. It seems highly likely that the envelope pockets were deliberately made very tight-fitting. Damping the envelope pockets prior to introducing the chemise would have increased their elasticity and facilitated tight fitting - but there can be no proof that this occurred. It is clear that the chemise is fitted as a robust protective covering which is not intended to be removed once in place.

Fore-edge straps to side pins are passed through the primary cover and through the envelope pocket of the chemise, and in the case of the chemise with a large fore-edge pocket (a characteristic of some chemises from the twelfth to the fifteenth centuries on larger books) the strap may be tacketed to the flap so that the strap automatically drags the flap into position when the book is fastened.

In the late Middle Ages the use of textiles and of very soft tawed calf, kid and deer skin produced a chemise of a quite different character. The cover of the chemise could extend in any direction. If at the head or fore-edge, this would be used to wrap round the book to keep it clean. If at the tail it could be gathered into a knot (sometimes a Turk's Head or tied to incorporate a ring) and the book used as a girdle book - New York Public Library, Spencer collection, Girdle book, Germany 1454 (Photograph 6). In general, working books of the fifteenth century were given a chemise which met at the central area of the edges of the head, tail and fore-edge.
Fastenings - side-pins and clasps

The way in which a book with a chemise is fastened varies considerably from the early to the late Middle Ages. In the twelfth century for example, the strap supporting the catch was fixed into the upper board, it exited through a slit in the primary cover and then through an opening in the seam of the envelope pocket. It was often made of two laminates of tawed skin, frequently sewn fleshside to fleshside (giving a thickness of about 3.5 mm and thereby preventing long term stretching) very neatly, and terminating in a reticulated (often decorative) catch with a hole in it, which fixed over a catchpin (really a copper alloy rivet of about 2 mm diameter) set in the centre of the lower board. Alternative types of catch are sometimes employed, with the hole surmounted by two copper alloy plates on either side of the strap and riveted from one to another through it and some way in from the end of the tawed strap (which thus acts as a pull in its own right). Straps can also be terminated with a folded type of catch, where a piece of copper alloy is simply folded over the end of the strap and this folded metal supports the hole which is drilled through the strap and the metal faces. The terminating straps are usually fitted with a loop of metal through which a plaited tawed pull could be inserted.

In the later period there was an increasing tendency to use clasps rather than strap and side-pin. Fifteenth century books exist with the strap and side-pin arrangement; but in increasing numbers the use of straps which end in a clasp (i.e. a metal fitting with a hook at the end of it, which is engaged upon a catchplate) are observed. In the English early printed book period the clasp and catchplate arrangement, whereby the book is clasped at the fore-edge from the upper to the lower board (i.e. front to back) is all that is to be found.

Romanesque to Gothic

During the thirteenth and fourteenth centuries the increasing role of the secular workshop almost certainly had a profound influence upon the development of new techniques in bookbinding. The basic essentials of the
construction of the book remain largely unchanged38, but the execution of the construction, the techniques of binding and the principles underlying the work itself all developed steadily. It is very difficult to be precise about the date at which the Romanesque binding style gave way to the Gothic. In the early thirteenth century books were still being bound in the Romanesque style with tunnelled lacing paths, flat profile boards with only gentle shaping. The transition between the board shape of the early to late style appears to have been gradual, with the tunnelling of boards still continuing in some workshops at the same time as board cushioning was introduced. Hence, one finds some cushioned boards with very short tunnels and thin wooden bridges on the upper board face, and occasionally fifteenth century cushioned bindings with long style tunnelled lacing as previously mentioned. Gradually, the weight of the sewing supports decreased and the number of sewing supports increased. Further research for firm evidence is needed to support this but by the fourteenth century the number of supports had become a factor which must have influenced the cost of the work - suggesting that the presence of many supports on a small book was a reflection of the function of the book, and of the value placed on the book, by the person commissioning the binding.

The cushioning of boards and the development of a new style must have spread quite rapidly once it had gained acceptance, for by the end of the thirteenth century and by the beginning of the fourteenth aspects of the new style had become effectively universal. However, the changes were of necessity cautious. For example, in the first quarter of the thirteenth century the use of tunnelled boards was still widespread and overlapped the introduction of over the board edge lacing. It should be noted that it often took several years for styles and fashions in the South of England to

38 Unchanged in the sense that the wooden boarded binding continues to rely upon a sound sewing structure in the absence of adhesive, and also relies upon the laced-in endband as well as the main sewing supports to provide solidity of construction, and frequently the bindings continue to have a chemise.
appear in the North, as can be recognised for example in a study of contemporary monumental brasses. The situation is probably different in the monastic world as against the lay world, because the monasteries provided avenues for the spread of skills and knowledge throughout the medieval period. One is tempted to hypothesise as to why the Gothic style became accepted, to ask what triggered the change and to ask why inherently conservative craftsmen demonstrated a willingness to change their approach. It is generally unhelpful to speculate in this way, but there can be no harm in drawing together a number of facts and asking whether these can help our understanding. First, there was clearly a general movement and willingness amongst craftsmen to accept changes which helped them deal with new circumstances. The development of Gothic art and architecture was a European-wide movement, of which the developments in Gothic bookbinding can be viewed as only one minute detail. The establishment of new values with the secularisation of the crafts and the growth of a new class of patrons must have been instrumental factors in the spread and speed of acceptance of these changes.

In bookbinding terms, one wonders if the adaptations to technique are part of this overall trend. Could it be, for example, that the habit of lacing-on boards in a channel running over the face of the board into an inner channel and pegged at the end of the channel was a recognition by the binder that he could increase production by lacing-in over the face? Was this a reflection of a need to increase efficiency in the secular workshop? Especially because in the lay workshop, the craftsman had to make a living, whereas in the monastic setting it may only have been one aspect of a monk's everyday life. Was the desire to lace on the boards over the face a factor in leading to the comparatively severe cushioning of the spine edge? Do transitional books exist with softened spine edges but
comparatively flat head, tail and fore-edge edges\textsuperscript{39}? Was the widespread growth in the use of the single core endband from 1200 onwards (and the decline of the tab) a recognition of the need to abbreviate structure to fulfil demand? Did the new demands of the times lead to the invention of a new "Gothic" style?

Of course there are many bookbindings which do not fit the pattern, and it is really only possible to look for overall trends. At present it is probably true to say that we simply do not have sufficient information recorded to make such an assessment, but at least by asking the questions it is possible to glimpse the potential general historical value of understanding the history of the craft.

By the fourteenth century the cushioning of boards had become an established practice, and the developments of the previous century had been effectively resolved by different techniques of lacing-on boards. The endband became more uniform; it was still structurally important but had largely been reduced in size of core - nearly always to a single core format (this is not unknown pre-1200 even with no secondary sewing - but in the context of a diminutive scale and simplistic lacing method the trend is already identifiable) usually with a decorative secondary sewing sometimes with supplementary crowning cores. Research for this thesis indicates that in many respects the picture is typically very similar to that of the fifteenth century bookbinding, but older practices were still in use - many of which are to do with the care and attention spent on detail and with skill in execution. By the end of the fourteenth century one finds the

\textsuperscript{39} The answer to this question is a qualified "yes". Books of the mid-thirteenth century can be described as being in transition, with something owed to the Romanesque style and something to the Gothic style. As the style became accepted so the degree of cushioning became more pronounced and obvious, and the boards were laced on under a tension which led to the natural rounding of the spine and the naturally induced joint. Presumably this was seen as an advantage in providing greater board stability in a binding with surface rather than tunnel lacing.
first use of convergent lacing, but for the most part the lacing remained straight (this is often staggered).

The covering material used throughout the thirteenth and fourteenth centuries for wooden boarded books seems to have remained largely consistent. Alum tawed skin was recognised as a better material than tanned leather. The skin was in wide use in other crafts, notably in gloving, clothing and cordwaining. The material generally seems to be white at a superficial glance, but there can be little doubt that coloured skins were in widespread use, and if one examines bindings carefully throughout the medieval age there are examples of green, yellow and red\textsuperscript{40}. The considerable abrasion damage which most books have suffered, the fugitive nature of the organic dyestuffs (e.g. kermes and buckthorn) and the colours lack of fastness in sunlight accounts for the loss of much colour. By examining the turn-ins and under the pastedown areas it is often possible to discover a lost colour as the fifteenth century survey reveals. This is not to suggest that tanned skins were not also used, and there are examples of tanned calf in use as a bookbinding material throughout the Gothic period. Indeed, there are books which were bound in a semi-limp style in which the hide used is up to 3.5 mm thick\textsuperscript{41}. The use of tanned skins is very difficult to assess, because in general they do not have the permanence of tawed skin, and the survival rate of tanned bindings must be low. However, we can judge from the fifteenth century

\textsuperscript{40} In sixteenth century bindings, Nicholas Pickwoad has found large numbers of books sewn to alum tawed supports which were clearly derived from the off-cuts of other trades and are in various colours. First mentioned in his Hommee Randiera Lecture to the Bibliographical Society, 1993, held at University College London, and subsequently presented in The Library (Pickwoad 1995). (He does not record in writing his specific observations about the use of trade off-cuts).

\textsuperscript{41} For example Corpus Christi College, Cambridge MS. 212 is a thirteenth century English hide binding with pink alum tawed circuit trim, and tawed rolled, knotted thongs which are met with sewn tawed double laminate securing loops, crimson silk covered endbands, pink silk
experience that were tanned leather to have been in widespread use in the thirteenth and fourteenth centuries and before, we could expect to see more evidence of it. From the traces of tawed skin found on many pastedowns, binding fragments and so on, in addition to the extant medieval bindings, it is clear that tawed skin was in predominant use. There can be little doubt that the use of tanned calf in the latter half of the fifteenth century (in the quantity used) marked a significant revival of a material for bookbinding.

The typical fifteenth century binding?

In describing the typical bookbinding of the fifteenth century it seems appropriate to illustrate how two examples which give a superficially typical picture may at the same time have many unique or unusual characteristics. The purpose here is to give an overall picture, illustrated with specific details relating to two bookbindings. The detailed description of English fifteenth century binding is explained with full details in subsequent chapters.

1. An early fifteenth century prayer book

Jesus College MS Q G 30 is a very small devotional book with a contemporary binding which incorporates a number of typical features as well as some different structural features (Photographs 7a-d). It is a typical work of devotion including Prayers, Psalms of Vespers, Office of the Dead, and it commemorates English Saints including John of Beverley. It retains its integrity as a museum object, being whole and unaltered by previous generations of "repairers", and has probably survived largely unscathed on account of its size. The only real damage inflicted by later generations was the partial trimming of the chemise so that it could be stood vertically on the book shelf. When held in one's hands it feels entirely natural for use as a prayer book. One can discreetly turn the pages and safely use the book covering to primary endbands with tawed cores and linen liners to hide
within the cradling of one hand, and this harmony between book and reader is a most important feature of the book's structure.

Provenance

The original owner was Thomas Thormunby (fifteenth century, lower endleaf 1.r). The manuscript was bequeathed to Jesus College by Thomas Mann in 1685 (upper endleaf, f.4.v).

Binding Measurements

height 105 mm, width 85 mm, thickness fore-edge 50 mm, spine 55 mm

Endleaves

Although the text-block is of paper, the endleaves are of parchment taken from a fourteenth century manuscript, partly of historical importance (the building of the church at Hypapante at Constantinople and the plague in the time of Mauricius are mentioned) and are partly homiletic.

Text-block

In the case of the Jesus College manuscript, the text-block is of paper with parchment endleaves. The paper is of consistently good quality throughout, with a watermark of the head of a unicorn.

Sewing

Text-block height

<table>
<thead>
<tr>
<th>Tail</th>
<th>102</th>
<th>k88</th>
<th>73</th>
<th>43</th>
<th>Head</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12</td>
<td>k5</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

boards.

42 Briquet query 15786 (1363) from Tревіse (Briquet 1968).
The leaves have been very lightly knifed; that is to say the spine edges have 1.5 mm knife cuts to locate the sewing stations running the thickness of the spine.

The main sewing of the prayer book is rather unusual in English terms, being in what has sometimes been called Flemish style and what is now more reliably called double hole single sewing. In this sewing the thread passes beyond the sewing support (in this case tawed bands) and re-enters the fold of the quire below the support before passing up and across the support on the inside of the fold on its way to the next sewing station or to the kettle-stitch. This is a comparative rarity in English fifteenth century work and is primarily found in books sewn on single supports from Flanders. Caxton's binder, who betrays his Bruges origins time and again, also uses this form of sewing in making some of the large folio volumes of incunabula later in the century (the Corpus Christi, Cambridge copy of Lyndwode's Provinciale, EP-M-7, is sewn in this way, Photograph 8). The presence of this structure on the Jesus College manuscript hints at an émigré influence at work. However, it would be a huge assumption to state that because of the sewing the book is the work of an émigré binder. Influences soon became absorbed into general working practices and were undoubtedly passed from binder to binder. The isolated presence of this sewing and the failure to find widespread use of it in any large group of English bindings is more likely to be evidence of the general distrust of new practices, rather than proof of a foreign binder's work.

43 Flemish sewing is a rather unreliable term, being derived from the fact that large numbers of books sewn in this way were first observed in fifteenth century Flemish books. It was used as a short-hand by Christopher Clarkson when describing bindings for the Walter's Art Gallery 1977-8.

It is unhelpful to attribute too much to the use of place location in terminology, when there is no proof that the area concerned is that of a technique's origin. For this reason Clarkson has abandoned the term and re-coined it.
Lacing-on the boards

The Jesus College prayer book is sewn on to single tawed supports, and these are laced into the boards from the outer face into a straight lacing path (Photograph 9). This is one of the most common lacing paths of the fifteenth century and, in direction at least, is the ancestor of the Romanesque lacing mentioned previously. In general, during the fifteenth century, the lacing of the boards to the text-block travels over the outer face of the board in a knifed and chiselled entry channel to a drilled hole and then the support travels on the inner face of the board to a single anchor hole. This is usually pegged with a wooden dowel or wedge (often cut from the same timber as the board timber).44

Boards

The Jesus College manuscript has oak boards, which have been prepared with a soft cushioned shape. The prayer book has board cushioning which falls from 9 mm (with covering) to 4 mm at the board edges.

The books which have boards of flat sawn timber, as with the Jesus College book, present an interesting question. These boards were sometimes cut in a saw pit and were provided for sale by the Sawyer as planks, but they need not necessarily be of English origin and are in fact likely to be Continental. The boards are almost always 10 mm thick, and they are remarkably even in their thickness. It seems probable that this is good quality 1/4 cut imported oak. (For an explanation of this assumption see the description of timbers used in board manufacture in Chapter 5).

44 The route of the lacing paths during the century can vary considerably but the second most common after that found in the Jesus College prayer book is the convergent lacing - where two neighbouring supports converge on the inner face of the board and meet at the anchor hole.
Endbands

It is a little unusual to find that the prayer book does not have any endband, which tends to suggest that the book is an abbreviated model of a full manuscript binding.

Spine treatment

No linings have been applied to the spine, and the covering is not stuck to the spine, although there is evidence of tying-up either side of the band.

Primary Cover

The manuscript is full covered in reversed alum tawed calf skin (Photograph 10). The primary covering has the suede side outermost and the hair side to the board. The secondary covering or chemise has the suede side innermost and the hair side outermost.

Chemise

The chemise of the prayer book is a little unusual, because it is of a type where the envelope pockets which hold the chemise on to the book are formed in two different ways (Photograph 11). On the upper board it is standard and is sewn to the chemise as a separate piece (Photograph 12), whereas on the lower board the envelope pocket (in this instance really a sewn flap) is created by turning the chemise cover itself around the board and then by sewing it to itself at head and tail.

In most fifteenth century manuscripts the chemise was made with both envelope flaps being sewn as separate items to the chemise. The chemise covering always fitted snugly and, as earlier suggested, was probably damped slightly prior to fitting so that as it dried it clung tightly on to the boards. The chemise is made of 1.5 mm thick alum tawed calf skin.

Fastenings

The clasp of the prayer book fastens in the typical English fashion from the upper board to a catch on the lower board (Photograph 13a-b and Diagram -
Catches, type 3). The clasp is made entirely of a copper alloy which has been cast and is decorated with a simple feather work design. This type of clasp and decorative design is commonly associated with the Netherlands.

From tawed chemise to blind-tooled tanned calf

The prayer book discussed is fairly typical of a small working book of the day, and is instantly recognisable as belonging to its period. In a sense, it belongs to an Indian summer in that the chemise attached to such a small book harks back to an earlier tradition, but the absence of endbands tends to look forwards to a different tradition altogether. The use of alum tawed skin rather than leather is a feature of the book, suggesting a medieval rather than early modern influence, but the make-up of the fore-edge clasp in one single piece of copper alloy with a catchplate on the edge of the lower board is unusual in this context and is an arguably later concept. The Jesus College prayer book has many typical fifteenth century characteristics as well as some special features. Perhaps the most significant and unusual feature of the fifteenth century stiff board book is the evidence for the development of another quite distinct style of book.

The use of tanned calf over wooden boards with blind tooling was not a new style for bookbinding (and the use of leather as opposed to tawed skin has earlier precedents), but in the second half of the fifteenth century it represents a revival of a Romanesque tradition. Note the tunnelled lacing typical of the early period in Pembroke MS. 147 (Photograph 14). This is a genuine Romanesque blind tooled binding on a copy of Ezechiel. Corpus EP-E-10, a fifteenth century blind tooled binding using allegedly Romanesque tools, but in reality fifteenth century tools cut in imitation of the twelfth century tools. Here the lacing is distinctively fifteenth century (Photographs 15a-c). This binding is on a Venetian imprint by N. Jenson dated 13 June 1480, of Aquinas de veritate Cath. Fidei.

There are examples of earlier fifteenth century bindings covered in tanned leather and with blind tooing on manuscripts, but it is with the age of the printed book that the use of this style of binding really becomes established
largely at the expense of the alum tawed skin binding with chemise, and by the end of the fifteenth century in England the latter had declined very significantly. To put it another way, the large rise in book production by printing was catered for in binding terms with a change in style to blind stamped tanned calf covering. This eventually led to one format superseding the other.

2. The fifteenth century printed book covered in tanned calf with blind-stamp decoration

The work of the Huntsman Binder on a contemporary printed book provides superficial glimpse of the late fifteenth century wooden boarded binding with blind tooled cover. In choosing this book, a deliberate decision has been taken to use an example which has been damaged by repair work undertaken largely in the 1950s, and it is hoped that this will demonstrate how much evidence can be lost through well-intentioned but ill-informed repair work. The more recent corrective conservation work did however allow an assessment of other aspects of the book structure which would otherwise have been unavailable in an untouched binding. The book in question belongs to Corpus Christi College, Cambridge (Parker EP-C-6) being a 1491 printing of W. Burley's Super physica Aristotelis which was printed in Venice by Bonetus Locatellus (Photograph 16a-e). The binding measures 340 mm (Ht.) X 235 mm (Width.) X 55 mm (Thick.).

Endleaves

Fragments of a fourteenth century manuscript with music were discovered under 1950's replacement pastedowns. The fragments suggested that they were once full pastedowns which had been carelessly removed.
The cream paper text-block leaves are on average about 200 micron in weight and have a pendant design watermark with flower shaped profile\textsuperscript{45}. The signatures are printed in the tail fore-edge margin, with a lower case letter and Roman numeral in typical fashion.

**Sewing**

It has been sewn on four stations which is fairly typical for an average printed book of the late fifteenth century - irrespective of its size (five stations are more common and three is rare)\textsuperscript{46}. The supports for the sewing are double slit tanned bands (straight i.e. not pre-formed into thongs) and the natural coloured thread is probably of hemp with an S twist of 45 degrees. The book has been sewn from the front to the back, and appears to have a sewing which is pulling the slit bands apart indicating a sewing route which is contrary to the accepted way of sewing double bands. The thread does not pass in front of the direction of the sewing and behind the two halves of the slit band before passing in front of the lower half and exiting through the centre before passing on to the next station (a standard route classified as all-along in the survey and the one which pulls the bands together upon tensioning). Rather, this sewing passes below the lower half of the slit support in the opposite direction to that of the sewing, before passing up behind the two halves of the support, in front of

\textsuperscript{45} Not in Briquet.

\textsuperscript{46} Even in the sixteenth century the reduction of the numbers of sewing supports to three is comparatively rare in northern Europe and tends to be viewed as Italian influence rather than as an economic indicator, except in special cases as with a Corpus fifteenth century example. Of course it is possible that the Binder D example may also be accounted for in terms of an Italian influence, but this does not seem very likely.

Nicholas Pickwoad discusses the issue of smaller numbers of sewing supports in the sixteenth century context of the Ramey Collection (Pickwoad 1995 p.219-221). He notes that the use of three supports is very
the upper half and exiting through the centre before passing on to the next station, thereby pulling the bands apart. The sewing is not packed. Some of these features of the binding are unusual examples of a number of strange practices which have been noticed in the late fifteenth century suggesting a new influence at work in bookbinding practice.\(^{47}\)

The use of oak bark tanned supports shows no respect for the strength and (as previously explained) generally understood superior properties of alum tawed skin. The fact that the tanned supports were pre-slit before attachment to the sewing frame with little attention to the thickness of the text-block is strongly suggested by the fact that the slits extend so far that they are drawn into the lacing channels at all stations and run the full length of the channels, in one place being divided by the pegs anchoring the band. The other end of the band was anchored to the frame with a pin or nail of some type (as witnessed by the single holes in the slips in the lacing channels on the upper board) - a feature suggesting haste and abbreviation in the work. Coupled with the analysis of the kettle-stitch (explained in Chapter 3) this lacing evidence reveals not only the comparative casualness of the work but also that of the direction of the sewing. The failure to pack sew the text-block demonstrates a lack of care with the mechanics of opening, and this places the tanned supports at an additional disadvantage. The choice of sewing route has placed further strain upon the sewing structure, by creating a weaker divided band with stress on the threads when the materials are flexed - as in opening, and has threatened the well-being of the spine folds themselves with the slight risk of tear-back. This is a poor quality sewing and seems to be lacking in traditional knowledge and experience.

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\(^{47}\) These observations were made when the book was undergoing recent conservation work, and when the broken slips exposed a joint edge and the ends of the broken bands with the thread route clearly exposed.
The disposition of the sewing stations has left a significantly larger tail panel than can be seen at the head, but this has nothing whatever to do with the aesthetics of layout for the vertical shelving of English books (a factor which did not appear until the late sixteenth century). The short explanation concerns the way in which the book was marked up for sewing, with evenly spaced supports. The sewer simply marked up from the tail (possibly with some form of dividers) until there was insufficient book left to make a further station, with the supports set at 73 mm apart. It is not uncommon to find the stations of some books worked out in exactly the same way - except starting from the head and thereby sometimes resulting in a smaller tail panel than head panel. This equidistant setting out of the bands is standard practice, but has often been confused as being optically deliberate on some books when it is merely accidental. The interesting aspect of this particular layout concerns the lack of attention to the spacing of the bands preventing a truly even spacing from head to tail (which is a characteristic feature of other slightly earlier printed books, and also of other contemporary bookbinder's work).

Lacing-on the boards

The slips of the sewing are laced in the straight style, that is to say that they travel in channels over the outer face of the board, enter through drilled holes and travel still at 90 degrees to the spine edge in channels to the anchor hole where-in they are pegged with soft wood pegs (probably replacements from the 1950s repairs). The interior channels have been gouged out and are distinctly oval in shape.

Boards

The oak used in making the boards is of good quality, quarter flat, sawn timber of continental origin (the excellent display of medullary rays on the face of the boards is good evidence of its superior quality and the spacing of the annual rings in even and narrow fashion reveals the competitive
nature of closely grown trees)\textsuperscript{48}. The calliper of the boards is 12 mm at the thickest point, and in this respect they are identical, suggesting that the original sawn plank was about 12 mm. The boards have been gently cushioned to vertical walls on all edges of around 6 mm, with a slightly stronger cushion of the fore-edge leading to a vertical wall of about 4 mm. The cushioning of the boards appears to be accomplished with a plane rather than an cabinet maker's axe or draw-knife. The board shape is not completely typical of the late fifteenth century, because the spine edge is not bevelled on the inner face (a common feature of many books of the period) and no joint has been induced, although the lacing-on of the boards has given rise to a slight natural rounding of the spine. There is no back-cornering of the boards or of the leaves.

Spine Treatment

No evidence of spine linings could be established, although these may have been removed at the time of the 1950s repair work. The original binding was evidently tied up either side and middle of band as suggested by the marks to be seen on the surviving cover. The spine of the text-block was almost certainly pasted at the time of covering.

Covering

The binding is covered in full dark brown tanned calf skin which by the standards of the day, is erring on the thin side at just under 1 mm thickness measured at the centre of the board. The leather has been pared or shaved (by the currier) all over, and not simply at the turn-ins. The turn-ins are of medium width but may have been pared after covering although this looks as though it may be subsequent repair work. The original dimensions of the turn-ins were probably mixed, with medium head and tail and wide fore-edge margins. The dark brown colour of the

\textsuperscript{48} A full explanation of the differences between English and Continental oak is given in Chapter 5.
leather is rather typical of those bindings associated with London⁴⁹. The leather has a smooth finish which may have been polished after the binding had been tooled. The covering of the book was pulled securely around the bands by tying up with two strands of a pronounced Z twist thread (hard twist) showing S on the cover. This of course suggests, as must be expected, that the spine of the book was pasted directly on to the backs of the sections or on to linings which may have been pasted on to the spine, for this is not a non-adhesive structure and depends in part upon the adhesive to support the spine area. (Sadly, this particular binding had been rebacked in the 1950s, hence the true nature of the spine covering is not known). The corners are of the tongue type (badly mutilated with only one full tongue present), and have been rather unevenly (in terms of size) and casually formed. It seems highly probable that the cover was pasted out along the spine, the turn-ins and perhaps along the board edge area, but possibly not across the whole board area.

Endbands

Unfortunately, the endband of this book was lost at the time of the 1950s rebinding, but the evidence of tie-downs still trapped in the centre spine-folds of the sections reveals that the book had worked endbands and the cores were once laced-in. The remnants of the cores survive as fragments of tanned leather cut straight and not twisted (possibly because the binder recognised the inherently weak nature of the material and wanted to avoid creating extra stress as with the main sewing). The endbands were rather abbreviated considering that there were only nine tie-downs at the head and approximately seven at the tail, in a book with well over three times that number of quires. The endband cores were laced through from the outer face of the board and travelled in a short channel on the inner face before being anchored with an oak dowel. This is a slightly more sophisticated lacing to that very commonly used in the fifteenth century.

⁴⁹ For an explanation of the London origin of this leather see section on
Fastenings

The books were clasped from the upper to the lower board in the English style, but all that remains of the fastenings are the stubs of the tanned calf straps. The straps were of wide profile (350 mm) on the upper board (extending 250 mm back on to the board face) but the outline in the leather of the catchplate on the lower board is comparatively narrow (10 mm). This suggests a typical late fifteenth century clasp manufactured from cut sheet metal (in a style sometimes associated with the Low Countries and the Germanic world) and catchplate. The straps on the upper board are fixed under the cover in a deep recess to accommodate a 3 mm thick strap (depth of recess at board edge), and were fixed in the recess before covering with two hand-cut copper alloy nails. The straps emerged through a neatly cut slit in the cover. The catchplates were surface mounted and given the profile and nature of the fixing it is fairly safe to assert that they were of two part design, whereby an iron striking bar was incorporated into a cut copper alloy plate, classified as type three in the survey (Diagram - Catches and Catch Plates 1). The catchplates were evidently fixed with two copper alloy nails of unknown type but appearing to be of round profile rather than flat cut (as observed in cross-section).

In addition, at the centre of the upper board is clear evidence of there having been a third clasp and on the lower board in the corresponding position is the outline of a third catchplate of the same type (but a different size, demonstrating that it is not a re-use of the earlier catchplates) as mentioned hitherto. The third strap was clearly fixed to the surface of the board but under the cover by means of two copper alloy nails of hand-cut variety. The nature of the attachment of the third strap, and the different size of catchplate shadow suggests that this third strap and catch are of different origin and were presumably added later when the first straps had been lost.
Decorative Blind-Tooling

The binding has been blind-tooled in the fashion which Oldham refers to as being the normal type, i.e. "an intersecting frame of fillets, containing stamps which are more often than not carried beyond the points of intersection, the space within being divided with diagonal fillets into lozenge and triangular compartments, each containing a stamp" (Oldham 1952 p.9, plate II). The stamps used in the Corpus binding include the depiction of a huntsman from which Oldham chose to name the craftsman making a group of ten surviving bookbindings. The binding also includes a fleur de lis stamp, and the classified ornament associated with his work numbered 334 in Oldham's list (Oldham 1952, plate XXV).

Observations arising from a study of the two bindings in a historical context

It is not the purpose to describe in detail here the overall structures of fifteenth century books. This is reserved for the later more specific chapters of the thesis. This section is intended to highlight the value of examining individual bindings to establish the importance of the subject to the history of books in general.

Text-block

In total, more manuscripts in the fifteenth century were written on parchment than on paper. The parchment used varied considerably in quality and in the animal species. The majority of the books were written on mediocre sheep skin parchment. It is interesting to note that in parchment manuscripts the parchment itself is sometimes sorted prior to assembly. It was noticed that in many books there was a conscious effort to place rougher and poorer skins towards the second half of the book, slipping them in every now and again in order to conceal them after using the best at the front of the book to give a better opening impression.
Sewing

For the most part, it appears that English fifteenth century parchment books were sewn on the frame with no pre-piercing; however, a number of book show knife cuts in the backs of the quire folds which do correspond to pre-piercing in that this has provided the sewer with a hole to work to. It is a feature of pre-knifing that it tends to be associated with paper text-blocks at this date, becoming rather more common in the printed book age. This knifing for locating sewing stations had historic antecedents, but reflects a re-introduction of an earlier habit. In the very early period, knife cuts took over from the 'V' cuts associated with chain stitch. Norman knifing could be deep whereas in the late medieval period in England deep knife cuts were not observed in any of the bookbindings surveyed, and in 90% of cases the sewing was achieved in the absence of any pre-knifing or of any lace pricking (i.e. when a pricking marks the location of the sewing support throughout the quire thereby locating the station on the inside of the fold). English fifteenth century knifing appears, on the evidence of the survey, to have been very light and shallow, and is associated primarily with the paper text-block rather than with the parchment one.

Boards

The boards of manuscripts were very rarely left flat in this century, but there is an immense range of board shapes. The most common board shape of fifteenth century manuscript binding is one of cushioning. This shape has a continuous curve as it falls away to an edge. Few books have cushioning which fall away to nothing at all, most have a shape which

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50 Late medieval manuscripts on parchment observed in Iceland and probably sewn elsewhere in Scandinavia during the fifteenth century did have deep knife cuts, and such knifing is recognised elsewhere in Europe throughout the medieval period. It is also to be found on manuscripts of English origin in the early thirteenth century.
takes the wooden boards from an average of 10 to 12 mm thickness to a vertical edge of around 5 to 6 mm.

The vast majority of boards are of oak (a characteristic of English medieval binding in general) a few have beech, Queens' College MS. 16 has elm boards (Photograph 17a-g). The boards provide evidence of different tool usage. Some of the bindings are obviously very provincial if not rustic. Much of the earlier fifteenth century Cambridge work falls into this latter category i.e. rustic. In the case of these books it is evident that the wood of the boards has been prepared locally by splitting the timber across the radials. The boards of many of these more simply made bindings were frequently shaped with the use of an cabinet maker's axe\textsuperscript{51}.

Unlike that which has been used for the rustic type of binding and which was felled locally and quarter cleft, some wood was quarter flat sawn in very even planks and much of this was imported. The importation of wood (particularly oak) was considerable in the Middle Ages, and Salzman has pointed out the widespread use of such timber in a number of situations. (Salzman 1967, p. 237-252). The quality of English oak was, in one sense, not as good as that purchased from Europe where the closely grown trees formed narrower but regular rings of annual growth and where long planks with fewer knots were possible. Oliver Rackham has suggested that if one looks at the wooden panels in the rood screens etc. of many English parish churches it is possible to see that the timber used for making the surrounds to the panels is frequently very different in grain pattern to that used in the making of the panels themselves. This is because the constructional timber is made from the English stock which was available in any thickness needed, whereas the more decorative panels are taken from imported stock which came to England already flat sawn and frequently used as ship's ballast\textsuperscript{52}.

\textsuperscript{51} For further details see sections on tools and boards in Chapter 5.
\textsuperscript{52} Relayed as the easiest observable example in a private conversation.
It is quite easy to tell the European oak from English oak by observing the spacing of the annual rings in the cut timber, but it is necessary to be very careful in studying historic examples because the cleaning or scraping of boards or the peeling back of covers is never acceptable. The imported wood always has much more densely packed annual rings with a much greater regularity of growth. From those books which were the subject of genuine conservation work boards have been studied without the need to resort to such radical treatment, and it is suggested that towards the end of the century most of the oak used in the making of incunabula book boards was imported.

Endbands

Typically in the fifteenth century we might expect to find compound sewn endbands e.g. a primary endband sewn in linen or hemp thread, to which is added two or three crowning cores by means of a secondary sewing in decorative coloured silks (Photographs 18 and 19, and Diagrams - Endbands 1, 4a, 4b and 6).

Covering

The primary covering of manuscripts was commonly in tawed skin with the suede-side outermost and the hair-side to the board. The secondary covering or chemise often has the suede-side innermost and the hair-side outermost. It seems that this arrangement of suede to suede may have something to do with the handling characteristics of the skins and helps the chemise to cling and support the thin primary covering, thereby helping to support the opening characteristics (Jesus College, Cambridge, 3)

53 The comparatively small number of historic bindings still in existence makes any interference with their historical integrity a matter of extreme concern. Much damage has taken place as a result of unthinking use of a structure made of almost perished materials often in an unstable condition. Work undertaken in the name of "conservation" (which has in effect nothing to do with that concept) has also reeked havoc on many early, very rare and sometimes unique book structures.
QG30 model, Photograph 20). It is noteworthy that many books of the period which have lost their chemise are often covered in a reverse skin and this possibly explains the preference for reversed skins. It seems unlikely that it was reversed to conceal scarred or poor quality skin when situated under a chemise and out of sight.

The importance of structural analysis in the study of fifteenth century blind tooled covered bindings:

Much has been written about the English blind-tooled bindings of the late fifteenth century, and many assertions have been made about date, provenance and binding location based solely or largely upon the decorative features observed. The analytical approach to the study of historical bibliography with its minute attention to every detail of book production from type analysis, composition, imposition, paper history, collation and press work and marks to printing impressions, decoration and so on. The work of manuscript scholarship studying book production from all aspects, such as textual studies, art history and palaeography and codicology to name but a few, proves without any question the limitation of any approach relying upon one type of evidence to substantiate the history of any given book. The study of bookbinding structures must be treated as just as significant and important an element in the history of book production as that concerned with any other detail. Bookbinding structures carry a uniquely important set of evidence which will contribute to our understanding of the archaeology and history of the book as a whole.

The examination of the book bound by the Huntsman Binder raises a number of questions about the status of the tooled binding in the 1490s, and the extent to which the printing press was leading the bookbinder into a need for greater productivity. There is much evidence to suggest that the runs of editions rose rapidly in the last decade of the century (from 200-300 to 400-500 and reaching 1000-1500 in the early years of the sixteenth century) with a corresponding drop in price (Pickwoad 1994, pp. 61-106). It is undoubtedly true that the wooden boarded book, characteristic of the
late fifteenth century continued to be made into the sixteenth. It is also
most likely true that the Reformation significantly boosted book
production, so that from the 1520s onwards very many more radical
changes in bookbinding structures took place. But the survey of fifteenth
century printed books made for this thesis suggests that many structural
changes were already accepted prior to the larger edition runs of the end of
the fifteenth century.

The work of the Huntsman Binder demonstrates well the limitations of
an exclusive study of decoration in order to understand the history of a
bookbinding. Oldham observes that "there are no peculiarities in his
work, which makes it extremely difficult to know which of the bindings
bearing his stamps are by him, as some of them are linked up, directly or
indirectly, with a bewildering number of other bindings, some bearing
initials, and one bearing the mysterious inscription A BATAS . I should be
inclined to assign to the Huntsman Binder only ten books that I know; if
that is correct, only ten stamps (one indecipherable) are his, and his books
are dated between 1477 and 1498 " (Oldham 1952, p. 30). It is not difficult to
discern the feeling of uncertainty in Oldham's remarks. But one must
stress that the value of the work of G. D. Hobson, J. Basil Oldham, Howard
Nixon and of Mirjam Foot (to name but the most prominent scholars of
decorative features on English fifteenth century bookbindings) is of
inestimable value in identifying helpful local differences, and this
significantly helps in the understanding of the spread in styles of binding
and of the movement of craftsmen. It also helps in an assessment of
archival accounts describing the binders' work, and has helped to identify
the names and status of specific bookbinders (e.g. Walter Hatley and his
work as Cambridge University Stationer).

Oldham's remarks about the binder revealing "no peculiarities" may well
be true in terms of the finish of the book and of its generally typical
outward appearance. Indeed, it is because the book is fairly typical of its
type that it has been chosen as representative of late fifteenth century
tanned calf bookbindings with blind tooling, but there can be no doubt that
in a structural sense there are many very strange features. The unusual sewing route chosen, the use of tanned leather as a sewing support, the type of lacing for the endband, the use of a gouge to produce oval lacing channels, the weight of the covering leather, the format of the turn-ins, the casualness of the cornering, the nature of the board cushioning are a few of the many characteristics which may not be unique but which all add to the picture of this craftsman's work. The kind of craftsman that he was, the speed and sense of urgency in his forwarding, the ways in which he obtained his materials and why, are just some of the questions and answers raised by the technical description of just one of his book structures. Clearly it is vital to include an assessment of the physical archaeology of the book if one is to begin to remove those doubts raised by Oldham.

54 The term "physical archaeology" refers specifically to the study of structural features, to the details of text-block assemblage including collation through to all aspects of the act of physically putting the book together. It is a term which most people would recognise as being an aspect of conventional archaeology. The "archaeology of the book" however, may also include textual features, and can involve other fields of manuscript and rare book study such as details of printing or palaeography.
Chapter 3
Book production in fifteenth century England

Fifteenth century readership in City Life

Books were produced in the fifteenth century for a growing readership. More people were literate, and whilst one must not exaggerate the growth in the potential readership there can be no doubt that even "middle-class" families were writing letters to one another in increasing numbers. The mercantile class turned increasingly to written documentation in the conduct of business, and the advantages of learning and of books became increasingly obvious. By the early sixteenth century, Sir Thomas More could boast that three out of every five people in the country could read, and a modern estimate suggests that 40% of householders in London
could read Latin. The number of Grammar Schools was undoubtedly increasing during the fifteenth century, but to what extent such an education was widespread is difficult to assess. We do know, however that William Byngham, a London Rector, saw fit to found Godshouse (later Christ's College) in Cambridge in 1439 in order to train teachers and thereby make good the shortfall in the number of schoolmasters in demand (Lander 1974, pp. 141-142).

The use of books in monasteries continued as previously, and such books were still being made in scriptoria (by laymen hired and working inside or outside a monastic setting); but the growth of a secular trade indicates that even books for monks were being made outside the monastic setting, especially in the case of the large antiphonals and books of liturgical polyphony, which were often produced in rather special circumstances.

Parish priests were also interested in owning service books and in making books of sermons and so on. They probably remained the single largest group of people using books in the fifteenth century on a daily basis, and must have continued to command a significant part of the market. Indeed, it has been observed that they would probably have attracted the attention of the early printers who were seeking to gain a foothold in the trade.

Books of morals were not uncommon, sometimes made by amateurs presumably to fulfil a teaching function, in one case at least, to serve in a provincial parish setting. (Clare College, Cambridge, MS Kk. 4.7)56.

55 This figure probably applies to London rather than the provinces.

56 Clare College MS. Kk. 4. 7 is a Dictionarium Morale. Given by Barnabus Oley, Master of Clare in the fifteenth century. The work is the second half of a sort of Speculum Morale. A large number of idealised trees are drawn, and on the trees are numerous leaves displaced in fantastic linear symmetry to which are added circular fruit. Each page has one or more of these tree forms. The exposed roots of the tree are inscribed with the main homiletic subject, and the stems, leaves and fruit carry the text.

The book was apparently washed and bleached in the early twentieth century. Conservation work in 1993 stabilised the object and arrested some of the damaging effects of the earlier treatment. The conservation work
During the later Middle Ages education became more widely available in Europe. For example, the numbers attending German Universities quadrupled during the fifteenth century. In the fifteenth century, Cambridge started to rival Oxford as a University of size and importance, and the first signs of local book production emerged there. In both universities one can identify books which have existed in the colleges from the time they were written, and their scribes, who were Fellows of the college (e.g. 1. Eton College MS. 44, Albertus Magnus on SS. Luke and Mark, written about 1480 copied from Balliol MS. 187, by 53 scribes, 10 of whom were Fellows of New College, Oxford 2. Pembroke College, Cambridge MS. 255) (Hamel 1986 pp. 134-135). In addition to manuscripts written in college for student use and which never saw a stationer or professional book artisan, there were many books simply purchased for teaching and many examples of this type of book survive in the collection at Corpus Christi College, Cambridge. Some of these appear to be amateur productions on paper, and show no evidence of ever having been bound prior to a binding given to them in the eighteenth century (Corpus Christi College, Cambridge, MSS. 210, 378, 235, 174, 244). Whilst there are examples of University books with quite elaborate decoration, one should never lose enabled an assessment of the sewing history. It is clear that the manuscript was sewn on four equidistant supports (k20, 50, 115, 180, 240, k270, text-block height 282). The quires were supplied with parchment stays (fourteenth century manuscript waste) which carry the early sewing evidence. The paper has the watermark of a bull’s head. (Unidentified in Briquet). Dimensions: height 300 mm width 220 mm thickness 30 mm.

57 It could be that the apparent modesty of Cambridge in the earlier centuries explains the minimal evidence of any equivalent to a centre of book production like Oxford’s Cat Street, or London’s Paternoster Row.

58 The Pembroke manuscript is especially interesting, in that it has never been out of the possession of the college. It is a copy of Scotus super sententiarum, L. II Franciscus de Mayronis questiones de Ente. The manuscript was written by Gerard Skipwith, Fellow of Pembroke. Dating the manuscript is not difficult, because Skipwith records himself that he finished it in college, on “St. Lukes Day 1460” (i.e. 18th October 1460), in the year of the Battle of Northampton and at the time of the ruin of the Lancastrians.
sight of the fact that University books were functional, often plain and were essentially teaching tools for student use. It is also worth noting that Oxford can lay claim to one of the best known examples of another class of book patron, namely the collector. William Gray (Chancellor of Oxford University c.1440) from Balliol College travelled across Europe and commissioned fine manuscripts from some of the best humanist scribes (e.g. through the bookseller Vespasiano in Florence, the scribes being Antonio Mario and Piero Strozzi) in the mid-fifteenth century; items of his collection are now to be found in his college (Hamel 1986, p. 233).

Books for aristocrats in the fifteenth century are usually distinguished by the number of miniatures and the richness of decoration. Books in the vernacular were often lavishly decorated, and covered many subjects, in the fifteenth century it was no longer only the nobleman who was familiar with books on many secular subjects - from hunting, painting, cooking and politics to plants, alchemy and warfare, to name but a few.

**Demand and supply**

Manuscripts were expensive items by any standards, and this high cost arises from the valuable nature of the materials used in manufacture rather than from high labour rates. The very nature of the craft work meant that it would often take a long time to make a book, and though labour was cheap in hourly terms, it was nonetheless an expensive commission to order a book because of the length of time involved. It is for this reason that most people's experience of owning a book in the fifteenth century would probably have been in the form of a devotional book such as a Book of Hours (judging by the numbers which survive) or perhaps of a family Psalter. Of the total population only a minute fraction would have had contact with books, even though almost anybody who was at all well to do would have owned at least a Book of Hours. Such books were produced in immense numbers by the late medieval booksellers and were sold by them throughout Europe. Further, it would be misleading and incorrect to assume that only the literate were interested in owning books or in commissioning them from the stationer.
As in any period one assumes that some books were a status symbol, and others were owned by some individuals for aesthetic, religious or political reasons.

It is interesting to note that the value of books as tools in persuading others to follow a cause and in developing ideas was just as much a part of the manuscript age as it was of the age of the printed book. The recognition by the Lollards of the power of books - not just as religious symbols of affiliation - is reflected in the secret commissioning of many texts. It is also reflected in the active collusion of craftsmen in the making of the books, and this, to some extent, demonstrates the sympathies of many of the craftsmen working in the making of manuscripts. The clandestine nature of these books is sometimes evident in the use of slightly contrived scripts, and in the failure to leave evidence of the individual craftsman's work. A London skinner, John Claydon, commissioned a manuscript of *The Lanterne of Light*, although he was unable to read. This book was widely discussed by him with his friends, and after it had been read to him by John Gryme, the maker of the book, and by John Fuller (one of Claydon's servants) he expressed satisfaction with it. In time, it was this book which was to be used to condemn Claydon as a heretic. The use of such books was often a clandestine affair. Sometimes heterodox texts were incorporated with orthodox ones, as a way of disguising, absorbing and owning such controversial material. The fact that such mixed texts can be found in books with a contemporary Royal provenance is indicative of the confusion created by the production of books of this type, and of the liberty taken by some of the stationers (Hudson 1989, pp. 125-126).

The extent of Lollard book production is very difficult to gauge because of the numbers that were destroyed, either by those who regarded them as heretical, or perhaps more often by their owners who feared that if caught with them they might be condemned; as John Phip commented during Longland's inquiries between 1518 and 1521, 'he had rather burn his books than that his books should burn him' (Hudson 1989, p. 136).
During the fifteenth century books did circulate amongst a wider readership, and they were undoubtedly made more accessible by greater use of the vernacular. More religious books thus became available and accessible, and with the wider use of paper, the number of books being produced at lower cost increased as the century progressed. There were many more miscellanies and anthologies of the works of various authors. There were doubtless countless volumes of sermons, most of which have subsequently been lost, and many of these books would have been provincial in character. Indeed, the provincial manuscript continued to be a major part of the picture, in spite of the growth of the great centres in London, Oxford and Cambridge. The monastic production of books did not cease, and there is much evidence that the work of the provincial bookbinder continued largely unchanged and unaffected by the city-based gild craftsmen. For example, the work of one fifteenth century binder in the Bury Priory collection is distinctive and local, identifiable by a naive sense of the contemporary style with a crude and steep cushioning peculiar to his work.59

Speculative Book Production

Long before the age of printing, the bookbinders' and stationers' trade was a flourishing one and, as far as one can judge, was expanding in scale if not in quality. To what extent this was a speculative expansion is difficult to judge. Much evidence has been suggested to support the speculative manuscript. There can surely be little doubt that the influx of Books of Hours from Flanders, and of other books written abroad for the English market, was indicative of a demand-led production. In England, the Book of Hours was taken to church by ladies to be read during the Mass. Clerestories with wider windows make their first appearance and pews

59 This is not simply a case of a number of binders using a house style. There are some books in the collection which have so many similar faults and characteristics as to tie them to a single craftsman. (Pembroke MSS. 45, 100, 223, 210 and 185).
with book rests are found in many places of worship - indicating a general need for light by which reading will be possible. Various factors have been identified as indicative of the work of speculative book producers. For example, many books have been found with the initials incomplete, especially where an armorial design is required (an argument used by Doyle and Parkes as evidence and observed in the Corpus Christi College, Oxford edition of Confessio Amantis MS. 67, to which they have added similar examples found in Bodleian MSS. Rawlinson C.446 and Digby 230). This theory has been largely refuted by A. S. G. Edwards and Derek Pearsall on the grounds that this could be explained by the Patron not specifying his wishes in this respect or the Patron not being entitled to use armorial bearings (Edwards 1989 pp.257-269).

More convincing evidence of a vibrant speculative trade in the late medieval age is the general changes which can be observed in books. In the fifteenth century there seems to have been a much increased efficiency in the production of books, and this may have circumscribed the patron's freedom of choice with a greater standardisation of layout and format. However, whilst the decoration of many books became very repetitive in style and content, with an increasingly stylised and uniform approach to the making of certain types of books, there was still a fine craftsmanship involved in the making of many such books, often with superb decoration in rich colours and exquisitely executed gilding, often finished with fine and delicate bindings (Hamel 1986 p. 159-185). The apparent uniformity seems to have been running in anticipation of and in parallel with the introduction of the printed book, and this standardisation is reflected also in the way in which the late medieval book was bound. Indeed, outwardly many bindings bear a remarkable resemblance to one another, and it is

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60 De Hamel’s comments on Books of Hours are particularly revealing in this chapter, indicating just how widespread they were and how they were produced with an almost set format - a theme which he recently expanded in a lecture at Hereford / Hampton Court Estate - Scriptorium 1995. Proceedings in publication 1997, no details available.
only when one looks at them structurally that it is possible to identify subtle differences by which they can be grouped: it is the board shaping, the methods of lacing, the colours of the tanned skins (in the later period), the endbanding systems - all of which hint at practices which were developing in response to changed circumstances and which reflected a significant increase in the demand for books.

Books commissioned by groups of people

Large numbers of books were commissioned by groups of people rather than by one person or institution. Books of liturgical polyphony, for example, often belonged to the members of a church, and in many cases these institutional members bequeathed the book to the church - thereby providing vital evidence of provenance and ownership. (Clerics frequently bequeathed service books to churches in similar circumstances). It seems that books of liturgical polyphony rarely appear in early library catalogues or inventories, and their existence in the possession of the great churches is difficult to trace. It therefore seems likely that the books belonged to the professional singers who worked in the churches and chapels of the nobility. The introduction of separate quaterns into the texts of these books also strengthens the theory that these were the working books of professional singers who adapted the book to cope with new settings and changing styles. Indeed, many works of liturgical polyphony existed almost entirely in the form of quaterns. In the case of the majority of the smaller working books of the type described, it would follow that, the commissioning of the book probably came from the group of singers who earned their livelihood from it, or from the composer of the work itself. Only in the case of the larger choir books is there clear evidence that acquisition was arranged at institutional expense, as recorded in the archival records and ledgers of the cathedrals. However, it was not until the second half of the fifteenth century that the composition of polyphonic music changed sufficiently for it to start to adapt to commercial pressures of production. Not until the early sixteenth century did it adopt regular
forms, and a sufficiently extended repertoire to be exploitable in printed format (Wathey 1989).

Demand and production techniques

The crafts involved in book production during the fifteenth century were still largely bespoke activities. No doubt some speculative work was undertaken by the scribe, but prior to printing it is hard to imagine that many manuscripts would have been prepared in advance of prospective purchase. There was, however, a move towards a more speculative approach in the late medieval age prior to the introduction of printing. New techniques were developed in response to this change, and it may be that some of the later changes witnessed in the binding of books had their origins in this early fifteenth century period. In terms of the standard fifteenth century manuscript (e.g. the Book of Hours) production shortcuts are not difficult to discover. One has only to look at the mass of illuminations in such books; many were copied in outline from one text to another by means of pricking out the outline and by spreading pounce across the leaf. The outline shapes would be transferred on to a leaf below and could then be drawn in (Hamel 1992 p.57). In the case of the binding, it seems more likely that both manuscript and printed book would have been bound only when the purchaser had committed himself. Nevertheless, the binding of books was not an isolated activity in the centres of book production, for all the book-making crafts were within easy reach of one another.

Cat Street - an Oxford centre of book production

Prior to the fifteenth century the trades involved in the making of books were controlled and protected by separate gilds. From 1403 there was a common mistery or gild of book artisans. This unification is interesting because it is obviously symbolic of the significant co-operation between the allied crafts. Once established outside monastic life as secular trades, there can be little doubt that the book crafts had developed an individual identity, but because the work was so interdependent, a close physical
proximity to one another was inevitable. It has long been known that there were centres where books were made in the great cities. However, until recently little has been known topographically which would give any sense of scale or detail to these centres. In 1960 the Rev. H. E. Salter's Oxford survey was published (Salter 1960); this volume, based upon cartularies, college archives and deeds and other archives, is helpful in listing the tenements in Cat Street. This street was a well-established centre for manuscript production throughout the medieval period. Salter's survey identifies the tenants, many with their occupation, in addition to giving details of the rent charged from a period running from the twelfth to the eighteenth and nineteenth centuries. However, it does not give a full picture, for these different archival sources provide good information about one tenement but little information about another. In the 1970s Graham Pollard reappraised the survey and used it as a basis for further research. He created a directory of craftsmen working in Cat Street and this survives as an unpublished manuscript in the Bodleian Library (Bod. MS Top). However, it is Salter's original survey which is of greater importance in the context of this thesis, because it provides the data relevant for a comparison with the picture of the medieval book artisans' workshop described by C. Paul Christianson (Christianson 1989).

The tenements in Salter's survey of Cat Street are sometimes described with dimensions stated in feet. These dimensions are based upon J. Skelton's plan made in 1843 in *Oxonia Antiqua Restaurata*, and this in turn seems to have been based upon the same archival sources which Salter used. The basis of this survey must therefore, be considered with a degree of scepticism, but the results of assessing the dimensions and of comparing them with the situation in London (which is far better documented) provide some interesting findings. Number 107 Cat Street (Tenement of Oriel), for example, which comprised two dwellings of 20 feet, was 40 feet North to South and 70 feet East to West, being positioned on a corner. These were rebuilt in 1452 and 1453. This is comparatively large but there is no indication of function - they were presumably dwelling houses - and there is no indication of sub-divisions within.
Number 110 Cat Street (Magdalen tenement) is described without dimensions, but it appears to have been approximately half the size of number 107. This dwelling was used throughout the medieval period by limners or bookbinders respectively, assuming that these were always completely independent skills (which may not be right). It is also quite possible, though unclear from the records, that the property was shared. In the fifteenth century it appears to have been generally frequented by bookbinders. However, in 1426 it was leased to John Wake limner, at a rent of 20 shillings. Assuming that rents were in part fixed by size of property, it is possible to relate one property to another, and to get some idea of average size. Sometimes this can be substantiated when the actual sizes of other properties are stated. Number 109 (St. Frideswide's tenement: Cutrich) is said to be 15 feet wide, and it was used by limners and bookbinders in the thirteenth century. Its use in the fifteenth century is unknown. Number 112 (Tenement of Exeter College) is particularly interesting, being about the same size as 110 and 109 (i.e. 15 feet wide X 20 feet long). In February 1425, the son and beneficiary of an apothecary, Robert de Wetewang alias Simon Somner granted to John Dolle bookbinder and his wife Joan a tenement with shops in Cat Street between S. Frid and Godstow. In April 1430, the Will of John Dolle left to his wife Joan a tenement in Cat Street between S. Frid and Godstow for her life; then to Will, his son. (P. R. O., Augm. Off. Misc. Books 330, p.52)\(^{61}\). From the 1470s to the 1490s the tenement was in use by the limner John Bray. Number 114 (a rent of St. John's Hospital) was used throughout the medieval period by limners, parchmentmakers and, at the end of the fifteenth century, a glover. Number 115, Grampound Hall, is described in the late fourteenth century as having a cellar in Cat Street. This property appears to have been about fifteen feet wide but extended considerably further back than adjacent properties. It was used by a succession of trades

\(^{61}\) Salter stating that John Dolle of the parish of St. Mary was still alive in 1454, queries the genuineness of the will.
from the early fourteenth to the fifteenth centuries, including illuminators, drapers, dyers, and finally a parchmentmaker.

It is very difficult to interpret the data provided, because there is inadequate information regarding the dimensions of the properties and the way in which the properties were used, save for the briefest of details about those who took out the rents. However, the information such as it is, indicates that Cat Street was very closely linked to the colleges and that it had become the focus of book production in Oxford to the extent that quite literally around every corner, and up every flight of stairs there would have been somebody participating in one or another activity concerned with the making of manuscripts. It seems unlikely therefore, that there were large numbers of others working in these crafts elsewhere in the city at the same time. Of course, it is difficult to tell whether or not every aspect of a trade was carried out on the premises, but it seems likely this was the case. The close links between the crafts in such buildings must have involved a good deal of co-operation and by the fifteenth century the gild structure would have significantly reinforced this co-operation. It seems that the crafts worked alongside one another very happily and that the essential interdependence survived well after the introduction of printing. As reported in the history of Caxton's printing there was a self-imposed limit on the use of contemporary English texts as part of this same tradition (Sutton, 1995, pp. 62-67). When looking at a fifteenth century book from Oxford one must to some extent be influenced by this picture. For example, are the bindings the work of one craftsman, or does the book reflect the work of more than one trade?

In discussions with the Oxford Archaeological Unit about the dimensions of the buildings in Cat Street, it became clear that a considerable amount of work still needs to be undertaken before an accurate picture can emerge. Recent excavations appear to have unearthed a plummet (described as a pencil like utensil made of lead) at a tenement not previously linked with manuscript production in Cat Street, and this proves that too heavy a reliance upon archival sources, or any specific source, may be misleading.
These excavations beneath an area belonging to the Bodleian Library, have also provided some evidence of boundary walls and this should provide further information about the dimensions of workshops\(^\text{62}\).

**Paternoster Row and the London book artisans**

A most interesting aspect of the Cat Street evidence is provided by a comparison with the centre for manuscript production in London. Professor C. Paul Christianson used a series of printed archival sources in an effort to uncover details of the London medieval book trade. He used the Calendars of the Plea and Memoranda Rolls (1342-1482) and the Letter Books of the City (1275 - 1498), which cover transactions of the Mayor's Court and matters of civic administration; the indexes of early Chancery proceedings (1385-1529) and the Calendars of the Close Rolls (1227-1509), which often reveal the ordinary citizen's relations to the central administration; and the indexes to the London Testaments and Wills, especially those available for London residents. He also used a number of unpublished sources, including probate wills proved in the Prerogative Court of Canterbury and in three London Courts, the Arch-deaconry, the Commissary, and the Hustings. In addition, he made wide use of the journals of the City's Common Council (1416-1527). "The most important source used for showing details of shop rentals to book trade members ... are the records formerly kept by the Wardens of Old London bridge. These documents include the deeds of properties bequeathed to the Bridge ..., the Bridgemasters' account rolls (1381-1405), the Bridge House account books (1404-1525), and the books of expenditures of the Bridge (Series 1 and 2, 1404-45 and 1505-38)." (Christianson 1989 pp.87-88)

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\(^{62}\) In private discussions with the Oxford Archaeological Unit, I have established that there is far more recent evidence requiring assessment by the bookbinding historian and other scholars. In recent work underpinning part of the Bodleian Library's ancillary buildings, which cross a part of the old Cat Street, artefacts have been discovered which may be associated with the writing and binding of manuscripts. To date these
Christianson identified 254 people working in manuscript book production (i.e. craftsmen) in London between 1300 and 1520. The largest group were the stationers, numbering 117. The specific crafts in which they were involved present slight problems, because we know that some of the stationers were certainly involved in other work. The division between the work of the stationer and that of the bookbinder can be a fine one with binding work taking place within the context of the stationer's shop\textsuperscript{63}. Indeed, as Christianson observes, from about 1440 onwards with the establishment of the common craft gild under the title of 'Mistery of Stationers', with the exception of the title of 'bookbinder', the term 'stationer' became the predominant tag for all book craftsmen.

Christianson noted that in the records he searched it is clear that one stationer was also a grammar school teacher, five were notaries, two were haberdashers, two drapers and one a legal scrivener. The presence of the draper is an interesting coincidence, because amongst the craftsmen listed in Cat Street were glovers and drapers. The fact that there was a good deal of overlapping between the different trades is not surprising, but it does make for difficulty in the interpretation of records. In spite of this, Christianson was able to identify 35 limners (including ten also listed as stationers), 30 text-writers (6 of whom were also stationers, 3 legal scriveners, 1 a draper and 1 a parish clerk, and 1 a clerk to the chapel on London Bridge), 6 text-writers and limners, 44 bookbinders (18 listed also as stationers, 4 as scribes, and 1 as text-writer and notary), 12 parchmenters (of whom 2 were also stationers, 1 a haberdasher and 1 a bookseller). The remainder were servants to the trades. Interestingly, this breakdown of the ratio of trades is broadly reflected in fifteenth century Cat Street, and the picture of the two centres seems very similar in other respects.

\textsuperscript{63} To this day there is doubt as to whether the binder known as W G & I G, whose monogram appears on many late fifteenth century printed books,
This concentration of London book craftsmen seems to have been located in one fairly small area in Paternoster Row. Christianson has identified 136 who, at least at one point of their career, were located within parishes whose churches stood within five hundred yards of the crossing of St. Paul's. The Bridge House Accounts for 1404 list the shops in one section of Paternoster Row which contain many of the artisans concerned with book production. Christianson has calculated that the section was 160-5 feet long. The Accounts record the presence of thirty shops, and he has calculated from this that thirty shops could have been accommodated on two storeys in which case they would have been approximately eleven feet wide, or sixteen feet if on three storeys. He believes the shops to have averaged ten by twenty five feet and to have been divided into two rooms on two floors. Dimensions of this sort are confirmed by records for the construction of other medieval shops: with a frontage averaging twelve feet in width in one instance, or as in the case of a separate group (specifically built on the instruction of the Dean and Chapter of St. Paul's) eleven by twenty five feet, with each unit being divided into two rooms. There were some smaller units constructed in 1391 measuring ten by ten and a half feet (Christianson 1989 p.94). The strong concentration of artisans in Paternoster Row - a very small area - seems to be, in part at least, associated with the rebuilding of the shops circa 1388, and with an apparently unexplained rapid growth in the numbers of artisans at about this time.

By the beginning of the fifteenth century, this group of craftsmen had become established members of the community, dealing freely with members of the established merchant class and many acting as Freemen of London. They also enjoyed the use of credit in the form of debt transactions which involved payment in goods and chattels. Fifteenth century England was still largely a cashless society.

was a stationer or a binder - it is interesting to note that bookbindings in this group often share many structural as well as decorative features.
This picture of the thirty shops in Paternoster Row is very similar to the arrangement likely to have existed in Cat Street in Oxford - many small units working closely together in allied trades. Indeed, the Bridge House record entries show that of the fifty-seven tenants at least eighteen were working in the book trade in the years 1404 - 1410. The group included three bookbinders, Peter Bylton (also a stationer who dealt in older books and an owner of tenanted properties), Roger Dunce and Richard More. In addition there were numbers of text-writers and limners.

Oxford and London compared

Whilst there is much detail missing from the picture of the late medieval book trade, there does seem to be a good deal of similarity between the centres in Oxford and London. The very small working units and the close proximity between the trades involved in book production are factors worthy of further consideration. It is also worth remembering that the bookbinder was frequently involved in working as a stationer and as a dealer in books. The exact relationship between the man named as a bookbinder and his actual involvement in binding is hard to prove, because if he was described as a stationer and was also known as a property owner and as a dealer in old manuscripts, then he was also capable of hiring a "bookbinder" to do the actual work. We know that Caxton brought a bookbinder from Bruges with him when he first established his press, so why should not some of the earlier merchants like Peter Bylton have worked in the same way?

The small working units are interesting, because it is possible to make judgements based upon modern bookbinding experience to determine what is likely and unlikely to have been going on in such a small area. The variation in the quality of certain aspects of the work is particularly relevant in this respect, and the thesis will touch upon this question time and again as the structure of fifteenth century books is examined in detail. But to explain the relevance immediately, it is worth considering very briefly the question of the making of wooden boards. (This will be considered in greater detail in Chapter 5). It has already been explained that
in the medieval period much quarter sawn oak planking was being imported into England, and was in widespread use in the building industry, in the making of wooden panels in churches, fine buildings and so on. One wonders therefore if the wooden boards of books were a sideline of the carpenter with ready access to the supply. Once informed of the general sizes of books (largely determined by cutting and folding parchment) he could cut a supply of boards to rough size for the bookbinder. In a very closely knit society where the trades are interdependent and overlapping this is a perfectly reasonable suggestion. The finish on some boards is very rough compared to the finish on others, and one wonders if the "better" boards were being prepared and finished by the craftsmen who were skilled in working with the material, and if those cruder boards were being finished by the binder working on the corner of his bench with a less sophisticated set of woodworking tools. Squaring a piece of timber to act as a book board was quite a complex operation for the medieval craftsman. The numbers of out-of-square boards show clearly just how difficult it was, though some boards are beautifully squared in the fifteenth century. Is one looking at a more complex division of labour than at the beginning of the century? In examining the lacing channels in book boards we must surely be looking at the work of the bookbinder, because only he is going to know where to locate the slips. Yet in the fifteenth century one occasionally witnesses some very strange mistakes. At first glance one wonders if this is the work of somebody who simply did not understand what he was trying to achieve; for example, the wide fan shaped entry channels for narrow slips found on one manuscript binding (Jesus College MS. Q.A.10). The nature

Pembroke College MS. 224 demonstrates the reluctance of the binder to become involved in squaring the board. Here he has reused an existing board utilising the existing straight lacing channels, but has been forced to reduce the height of the boards which had more lacing stations than he needed. Hence, at the head of both boards an unwanted lacing channel is present, which crosses the path of the endband lacing, and which is present about half an inch from the extreme edges of both boards in the form of a channel on the inner face.
and location of the fifteenth century bookbinder's workshop is very important, as are the tools and materials at his disposal. The research into the key areas in Oxford London provides a wealth of information, and casts a different light on aspects of book structures in the fifteenth century.
Chapter 4

The fifteenth century English bookbinding structure

Text-blocks:

This section will describe the type of materials used in making the text-block, and will examine the collation of the leaves in general terms. It will describe the way in which paper and parchment were used in parallel for the making of books, and will explain how paper was gradually used in increasing amounts until the end of the century. It will demonstrate that the use of paper became increasingly significant in the making of manuscripts, at the same time as it had an almost universal application in the printing of books. Attention will be paid to the creation of mixed text-blocks of parchment and paper.

In total, more manuscripts in the fifteenth century were written on parchment than upon paper. The parchment used varied considerably in quality and in the animal species. The majority of books were written on mediocre sheep skin parchment.

Parchment

Parchment is a term which came into English usage in the eleventh century from a Latin form, and the word itself comes from the name of the Greek city of Pergamum. In England by the late medieval period it was simply a term for animal skins (normally sheep or goat) prepared for use as a writing support and for painting and engraving. It covers all animal species, and is now used again as the most useful term available for describing the material. The term 'vellum' causes many problems having been used in the past generically, when the term actually refers to a specific type of parchment (namely that made of calf skin). Theoretically parchment can be made out of many different animal skins at different stages of the animal’s life, but of course it is commonly manufactured from livestock which have other uses. Generally therefore, it is made from
goat skin, calf skin or sheep skin. Parchment is the animal skin after it has been washed and de-haired (with much of the fat extracted) and dried out under tension.

In order to understand the ready availability of animal skins in England for the secondary trade of parchment making, consideration must be given to the nature of English farming from the twelfth to the fifteenth centuries. It is clear from such an analysis that the feudal agrarian society was far more efficient than is popularly supposed.

Medieval sheep farming

The conventional view of livestock farming can be explained in terms of the seasonal changes as the determining factor. During the winter months livestock had to be sheltered and protected from the weather, and this commonly occurred in the same living quarters as that of the human owners. The dwellings were small, often only two rooms, and space was therefore at a premium. The use of root crops as fodder for winter feed did not become available and was not practised until the post-medieval age. In these circumstances, there can be little doubt that only the best animals were preserved for the following year, and very large numbers of animals were slaughtered in the autumn prior to the preparation for winter. Consequently, at least once a year, very large numbers of animal skins would have been available for parchment making. The reality of the autumn cull on a large scale must have been true for many working in the established manorial system, but the significance of conventional practice is diminished by a more detailed examination of the highly organised large scale landowners.

It is the failure to recognise that feudal society was more complicated and diverse than was previously thought which has led to misunderstandings. The conventional view assumes that all livestock held in small numbers was largely the concern of the villein, but it is well known that huge flocks of sheep were also sustained by wealthy landlords such as the King, the Barons, Lords and others. The Monasteries were amongst the wealthiest
owners of landed estates and from the twelfth century began to take steps to bring their land directly under their own control. The Benedictines of Ely were feeding 13,000 sheep in 1086 as recorded in the Domesday book. By the twelfth century there were large and highly lucrative markets for English wool. The growing population led to the development of greater demand in the chief weaving towns - Lincoln, Beverley, Stamford, Northampton, Leicester, York, Oxford, Winchester and London. Continental centres in France, Flanders and Brabant made ever greater demand on the supply of English wool. Arras, Ghent and Ypres are noteworthy examples of this.

The Cistercians (a white order) built their monasteries in isolation, away from areas of intensive cultivation and away from the complex feudal structure of the Manor and village. They found that the greatest commercial asset to hand lay in the natural undeveloped sheep pastures they had acquired. Hence, vast flocks were grazed on the Northumberland and Yorkshire moors, the Lincolnshire wolds and fens, the Welsh valleys, the Cotswolds, and the downlands of Wiltshire and Dorset. On the river flats of Holderness, on the Humber, the white monks of Meaux grazed 11,000 sheep, but Cistercian domination did not last beyond 1300. In the fourteenth century the monastic house of black monks (e.g. the Benedictines) achieved greater numbers. By 1320, at Winchester Cathedral Priory for example, the flock owned was in excess of 20,000; and at Christ Church, Canterbury the number in the early fourteenth century was in the region of 14,000 (Butler 1987 pp.80-93).

The nature of the landscape underwent a transformation in the fourteenth and fifteenth centuries which further favoured the maintenance of large flocks. The cause of this transformation has been a debating point amongst historians for some time. This is not the place to discuss the causes, but an explanation of the issues does cast some light on the condition of agriculture and thereby on the availability of animal skins. It is argued by one school that the Black Death so denuded the land of manual labour that landowners were forced to turn away from arable crops to sheep
farming which required few labourers (one shepherd and his dog for a vast flock) as opposed to a dozen men needed for tilling, planting and harvesting. The other school argues that there was a much more aggressive policy on the part of landowners who systematically set about enclosing the land to increase their control over it and to manage its exploitation for financial gain. It is perfectly true that many villages became deserted and were lost forever. The essential point, however, is that the growth and development of the wool trade was unrelenting and vast numbers of animals were bred to meet these demands. Throughout the fifteenth century wool prices remained buoyant and the landowners (such as the Berkeleys, the Howards, the Hungerfords, the Stonors, Sir John Fastolf, and the Abbots of Gloucester, Dorchester, Oseney and Winchcombe with many others) abandoned arable farming in favour of their demesne sheep flocks. The process had become irrevocable whatever the true cause (J. R. Lander 1974, pp. 35,36).

It is impossible for such vast flocks to be reduced to small numbers in a winter cull. However, there seems to have been little research into how vast flocks of animals were sustained through the winter. It is known from monastic records that the management of flocks was sometimes highly centralised. At Pershore, for example, the abbey managed its flocks through the one manor at Broadway, with one stock keeper controlling a team of shepherds. The monastery, like the lay baron, would bring all the flocks together on the pastures of marsh and moorland during the summer, and in June the clip would take place. In the autumn some thinning did occur, but large numbers of animals were kept throughout the winter having been folded into individual manors, where they could consume winter feed and stubble.

The great medieval barns and byres (and dairies in the case of cattle herds) would have played an important role in the maintaining of such large flocks. It is therefore no surprise to learn that farm buildings increased dramatically in number throughout the medieval period, and that some of them were constructed in stone where it was readily available (Butler 1987
p.91). The general care and careful breeding of livestock on the large demesnes clearly related to animals in general and not simply to sheep.

An understanding of the scale of the wool trade allows us to appreciate a number of factors concerning the production and use of parchment in the Middle Ages. There were many fine young animal skins available throughout the medieval period especially during the latter part of the Middle Ages as flock sizes grew. Therefore, when the market for books increased exponentially, a large stock of skin from which to select raw material was available to the lay craftsman who had supplanted the monastic scribe. This enabled the craftsman more easily to offer grades of parchment related to the grade of manuscript - according to commission by patron, subject and so on. The lay craftsman had far less need to care about the quality of his materials once a larger market gave rise to a far wider range of texts at differing levels of prestige. This is not to say that cheaper manuscripts were not produced earlier in a monastic setting, but it does suggest that the scale of production led to far greater flexibility in the use of inferior skins.

It has often been suggested that the number of manuscripts written in the medieval age and the number of animal skins involved in their production imply lamentably poor animal husbandry, involving massive slaughtering. However, when a careful analysis of manuscript format is

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65 There is no evidence of a brief being given to the parchmentmaker by the scribes for identifying particular animal skins required for the manufacture of the excellent calf parchments used in the making of certain manuscripts in the late eleventh century, when the codex reached its high-point.
undertaken, it seems that there has been a gross miscalculation of the numbers of animals required for the making of a single codex. This miscalculation is further compounded by the use of split skins. During the thirteenth century, the use of very thin, fine parchment can be observed in the making of French pocket Bibles. The parchment used in these manuscripts shows that mixed grain splitting and flesh splitting of parchment was possible and was not that uncommon. (This kind of evidence must not be confused with the familiar flesh splits often seen in modern sheep parchments i.e. skins which are swelled with water prior to liming and split with a knife to give two sheets of parchment from one skin). The existence of grain splitting in fifteenth century Italian humanist work was first mentioned to me by Christopher Clarkson during a preliminary examination of Corpus Christi College, Cambridge, MS. 159. This suggests that the parchmentmaker had the necessary skills to undertake the work, but on the whole it seems unlikely that the widespread use of this technique can ever be proven, because the technical comparisons required to prove splitting would involve very special circumstances (e.g. disbound leaves would have to be placed over a light table and grain patterns matched in leaves without good grain surfaces).

66 Febvre and Martin dispute the theory which suggests high numbers of manuscripts equals large consumption of parchment skins. They point out that texts do not take anywhere near as much parchment as scholars have often asserted. By a careful interpretation of the format of manuscripts a calculation is made of the amount of parchment that it would actually take to make a given manuscript, and this is compared to the popular idea of the amount of parchment required. They give the example of the Countess of Clare s 1324 commission of a copy of Vitae patrum, which D. V. Thompson alleges required 1,000 skins (Thompson 1939). They suggest that Thompson s suggestion is mistaken, since written in two columns, "the text generally fills 150 - 160 leaves of 25 cm X 16 cm, or a total area amounting to no more than 6 square metres - a dozen skins at most." (Febvre 1990 pp. 17-18)

67 William Fisscher, of Cowley's parchmentmakers in Newport Pagnell, believes that grain splitting is virtually impossible and regards the technique as impractical. Nevertheless, Corpus Christi College, Cambridge, MS. 158, an Italian humanist manuscript on goat skin does appear to have
No evidence was found of grain splitting in fifteenth century English books, which is not surprising because the great age of parchment making had passed with the twelfth and thirteenth centuries. By the late Middle Ages some very good parchment was still being made but the very high quality manufacture was on the whole declining. Indeed, by the fifteenth century it would probably have to be to the Italian humanists that one would look for the exceptional attention to finish. Splitting or no splitting, it seems that the more conventional and established theories about parchment making still have much to commend them, for there certainly was a massive trade in parchment, and as a material it was clearly in such demand that even the poor quality skins were patched up and used for manuscript production.

There can be no doubt that the medieval farmer did have more serious problems with livestock than is experienced today. The quality of his animals, by and large, was poor when compared to modern livestock. In an age of selective stock breeding it is not easy to accept that the medieval parchment maker would perforce have had quite different criteria when sorting the pelts. The medieval sheep, cow, pig and goat was a much smaller beast. The size of the animal may in some respects have been one of the determining factors in its use for parchment making. For example, it is reasonable to suggest that large skins of calf parchment may have been used in the making of the great bibles and antiphonals simply because the calf was the only animal large enough to produce a suitably sized bifolium. It is obvious that calf produces a superior parchment and this is doubtless a major factor, but the size of the animal must not be overlooked, especially where it has a determining influence on choice of species.\textsuperscript{68} The actual grain split skins. It may be that the art of splitting parchment has simply been lost. Certainly, there are no parchment makers today undertaking this kind of work.

\textsuperscript{68} The cost of calf was significantly greater than that of sheep parchment. Michael Gullick has instanced the Beaulieu Abbey Accounts of the mid-thirteenth century where he discovered that Grade 1 calf parchment cost 2s 6d per dozen and Grade 4 1s 4d, whereas Grade 1 sheep parchment was
quality of the skin was probably of less concern, because in the case of sheep parchment at least, with such numbers to choose from, it was easier to obtain a number of good skins for parchment making. Inferior pelts could always be sold for use in other trades, or for the making of cheaper grades of parchment. The impression must not be given however that parchment was some kind of by-product, as indeed it was in the post medieval period. (There exists some very crudely made eighteenth century parchment).

Research into the use of the different animal species used in parchment making is as yet too inconclusive for definite theories to be put forward. Nor is it the purpose of this research to investigate in detail the use of parchment; but given the present state of analytical understanding it does seem important to ascertain whether sheep, goat or calf (the latter being the easiest and most reliable to identify) was used in the making of parchment for fifteenth century books, and to give some idea of the variety in the quality of the parchment used. More research needs to be done in

1 sh. per dozen and Grade 4 was 3d even allowing for size differences there is a noteworthy differentiation (Gullick 1991 pp. 145-158).

69 The methods of analysis available for determining animal species in parchment are still rather dubious: in the case of simple visual identification there are problems, save where there are obvious veins as in calf skin, but the identification with certainty of sheep and goat is far more difficult, especially if it has been given a high nap on both surfaces or has been heavily abraded. One Italian scholar (Carlo Federici - in a lecture given at Erice in 1992) has suggested microscopic examination of the hair follicles may provide good evidence, because the hair of sheep emerges at 90 degrees to the skin surface, whereas goat hair emerges at an angle to the surface of around 45 degrees. This may be helpful, but one wonders to what extent the stretching into zero weave of fibre lay, in making the parchment, may distort the direction and angle. The gelatinisation of the collagen fibres and of the ground substance on the skin surface tends to conceal all but the deepest hair follicles. The Italian approach to the identification of animal species in the making of parchment has been discussed in an article, in which it is argued that the use of calf skin is more widely to be found than was previously thought possible (Federici 1996, pp. 146-153). Some animal skins do have more pronounced features than others, so it is often easier to distinguish goat. It is also useful if there is any natural scar tissue in the skin, because the follicles and epidermal
order to reveal whether the use of goat and of calf predominated in the early medieval period with an increase in the use of sheep later.

The impact of the wool trade explains why, in my survey of fifteenth century bindings, manuscripts of sheep parchment outnumber those of other animals by at least two to one. (Given the amount of tanned leather used in bookbinding, there appears to be an innate distrust of sheep skin. Of the number of leather bindings studied, only a very small proportion were of sheep. The majority were of calf, though the same did not apply in the proportion of tawed skins used in bookbinding. Here the commonest tawed skin used was sheep skin).

Despite the fact that parchment during the fifteenth century was less consistent in quality than that of the twelfth and thirteenth centuries, there are some superb examples of text-blocks that were assembled with close attention to selection. Throughout the medieval period much parchment was used for purposes other than book production, and it is difficult to establish what criteria were used in selecting skins for parchment making. Many sheep parchments were scarred, and often there is evidence of parchment makers having repaired the skin, probably whilst stretched on the herse. Sheep skins also frequently exhibit signs of the

pigments usually survive best in these very localised areas, and sometimes the hair of the animal may even be evident (see for example N. Pickwoad's unpublished report on Corpus Christi College, Cambridge, MS. 23, an eleventh century manuscript on goat skin with rust coloured hair around scar tissue) (Pickwoad 1987). By examining groups of leaves a composite picture may be provided, where several factors contribute to an identification e.g. hair follicles, belly axillary features, spine characteristics and so on. In some cases the only certain method of identifying skin would be professional histological analysis, if the evidence has survived the liming, scraping and tensioning processes. Where the evidence is missing, some form of DNA testing will give a positive identification, and sampling and dyeing with formalin can also provide helpful results. In the case of the survey of books for this thesis, either a linen tester or a X 10 stereo binocular microscope was used with cold light fibre optics. But no claim is made as to the accuracy of these methods, and it seems realistic to accept that the margin of error could be as high as 25%. Other visual characteristics can help with identification (Cains 1992 pp.50-61).
liming process having, a pronounced but unhelpful bleaching effect by adding to the blandness of the skin making it harder to give a definite attribution. Some sheep skin parchment seems to have been treated, as today, with a calcium carbonate wash to extract additional fat from an inherently fatty skin. Determining precisely what one is looking at when observing loose white powder on the surface of the skin, without recourse to chemical testing is virtually impossible, or the fact is that the presence of chalk does suggest a fatty skin. Goat is also fatty so caution must be used in assessing similar skins. Cowleys of Newport Pagnell still use chalk in solution to assist with the removal of fat deposits in greasy sheep skins, and this is applied whilst the skin is still on the herse, thereby ensuring that most of it is scraped away with the familiar 'luna' knife70. The use of chalk in parchment manufacture has been noted in at least two recorded fifteenth century recipes (Gullick 1991 p.146). The chalk is often observed around the flay holes and axillary areas, and it is often therefore at the edges of the leaves.

In many of the larger manuscripts, the skins have not been quite large enough and show signs of trimming through the axillary areas and

70The way in which the blunt 'luna' knife is used can significantly affect the finished parchment. The punching action of the knife helps fibril bundles to form laminally and thus gives some parchment its familiar sheet-like flex. The curved knife or scraper removes the final layers of scud and weak tissue in a peeling action which causes the layers to separate, but without cutting or scraping, which simultaneously removes water and gelatinised collagen and finally sets the fibre bundles to give the parchment its optical and surface characteristics. Working from the flesh-side eventually the smooth boundary surface of the corium layer is revealed, and the hair root and remaining residue of the epidermal layer from the hair-side is removed. The process termed 'punching', and described by one parchmentmaker in detail, is a peeling and squeezing action which reveals the fine silky finish of the corium layer giving the parchment its "opacity, drape and flexibility" (Vorst 1986 p.209) (See corium, Diagram Cross-section cattle hide). The scraping with a luna knife, often depicted as a kind of stereotypical image of parchment making, takes place only after controlled drying has occurred, and is then undertaken on the hair-side only to remove follicle pigment, to even up colour and thickness and to create a smooth writing surface.
consequently, one can observe flank tissue. It may be erroneous to do so, but where these characteristics are observed it has been generally accepted that the skins can be classed as mediocre because no effort has been made to conceal blemishes. The best skins however were usually selected by the scribe and placed towards the front of the volume to give the best impression as previously mentioned. At the same time the inferior sheets were scattered (often in the second half of the volume) to lose them - perhaps one poor bifolium per quire. The parchments rarely exhibit evenness of colour, although the flesh-side inevitably has a whitish appearance and in the surveyed books there was noticed a conscious effort on the part of the scribe to produce a very fine nap by means of extensive pouncing. This description refers solely to parchment made in Northern Europe for the writing of books and, in the context of English manuscripts at least, it is likely the same is true of earlier medieval periods. The very regular and fine surface of the nap given to most calf skins was obvious, and the species was confirmed by the presence of veining. (Colour was not used in this survey as a means of identifying skins, although it can still provide helpful initial clues).

The types of English parchments used in the fifteenth century as revealed by the survey of books suggest that approximately 63% was of sheep skin (possibly 6% of which may have been goat skin), 19% were of calf skin. The remaining 18% can be divided into 9% possibly sheep skin, and the

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71 This grading was arrived at following discussion with Michael Gullick, who has examined many twelfth century manuscripts and who made helpful suggestions as to how to grade parchments used by the scribes.

72 In the past some scholars have relied upon light and dark to distinguish hair from flesh surfaces and, even more bizarre, some have used colour to distinguish between species. It is true that colour, sheen and general appearance do provide useful clues, and in some cases a mere glance at a particular skin will reveal an obvious contrast and suggest a different animal skin - an inserted leaf and so on. But this is unusual.
remaining 11% are of unknown origin\textsuperscript{73}. The sample concerned was mainly composed of manuscripts from England, and there can be little doubt that other areas of Europe less involved with wool production would almost certainly produce different results. The use of different animal species does not seem to relate to chronology. The animals were used in fairly similar proportions throughout the century, allowing for some differences in the status of the books examined. Calf skin parchment was used on smaller as well as larger books and seems to have been reserved for the more prestigious work. It was observed that in general the skins from all manuscripts were fairly uniform in thickness within the individual text-block. The weight of parchments varied little compared to early manuscripts such as the Book of Kells (Cains 1992). Indeed, there seems to have been a conscious effort on the part of parchmentmakers to provide skins of about 150 to 300 micron for general calligraphic use. Of course there were many exceptions which proved the rule. In the case of endleaves, which were usually added to the text-block by the binder in the fifteenth century, there was a much greater variation, with a tendency in many cases to use very heavy parchments up to 1000 microns.

In the survey, parchment was graded as follows: (1.) Excellent parchment, with evenness of colour, finish and weight coupled with an absence of flaws. (2.) Above average parchment, when a text-block contained many excellent leaves but also had some with mediocre features. (3.) Mediocre parchment, in the presence of blemishes, axillary pigment, flay holes, scar tissue and edges of the animal skin. (4.) Poor parchment, in the presence of all dominant adverse features. These judgements are in large measure based upon a subjective opinion, but by employing a system of grading according to the features observed it is hoped that a balanced assessment has been achieved.

\textsuperscript{73} No major effort was made to distinguish between goat and sheep because of the difficulties involved, although a proportion of at least 6% overall had goat skin type characteristics as indicated.
The quality of the parchment examined varied considerably. Identifying
the very fine parchments in a group of nine manuscripts (selected by me
in some cases without attention to date, simply to determine quality) of
small dimension, one was tempted to suggest that a uterine animal had
been used, but in the absence of good physical features no firm conclusions
were drawn. These skins had an extremely fine velvet surface and a very
white and even appearance. (e.g. Jesus College MS Q-D-4, Clare College MS
Kk.4.9 & Clare N' 2 1 {thirteenth century}). The thickness of the skins
averaged 90 - 110 micron.

In contrast to the very fine parchment, some coarse parchment was also
noticed in fifteenth century manuscripts. This parchment was sheep skin,
averaging 230 to 300 microns, it was usually quite dark on the hair-side
and comparatively light on the flesh-side, with much evidence of scar
tissue and a rougher surface. It was often used in combination with paper,
in mixed text-blocks, and is frequently found in those books made by
amateurs for teaching purposes: see Corpus Christi College, Cambridge
MSS. 24474.

Calf parchment was used for the superior work, and varied from above
average quality to excellent. In general, calf parchment fell into the higher
grades because it had fewer blemishes, an appearance which showed that it
had been sorted to provide minimal presence of axillary pigment,
evenness in preparation with an absence of translucent areas; and the
leaves of calf skin parchment text-blocks tended to be more accurately
balanced in the weight of the sheets. Its common characteristics were a
fine, even velvet for writing (usually pounced by the scribe) and the
presence of the distinctive but not obtrusive calf skin veins. A good
example of the best grade of parchment of this type can be seen in Corpus
Christi College, Cambridge MS. 61, an early fifteenth century copy of
Chaucer's Troilus in a fine upright hand. The calliper range is between 180

74 Because of subsequent rebinding it is not always possible to tell if these
were kept as quaternions in the fifteenth century.
and 220 microns (i.e. almost imperceptible), it is of even cream colour overall and all leaves match. The leaves are organised hair/hair to flesh/flesh (i.e. like to like) to the centres of the quires, although the leaves have been pounced to provide on both surfaces a very even velvet, which is fairly marked and obscures grain characteristics. Some of the Troilus manuscript is made of mediocre grade parchment, but this has been hidden away in the later quires of the book. The best leaves are placed to the front, which is fortunate because the very famous illuminated frontispiece of Chaucer reading to the Court is therefore on the finest parchment of the first quire. It is interesting to note that where leaves have a space allocated for additional illumination and initials the parchment chosen is of the best quality. This applies throughout the text-block.

Calf parchment can be broken down in the following proportions:

- excellent - 10%
- above average - 40%
- mediocre - 40%
- poor - 10%

If one compares the quality of calf skin parchment used with that of sheep skin, a different picture emerges. This tends to reflect the much more widespread and general use of sheep skin parchment allowing much greater use for the mediocre grade. The same criteria were applied in assessing quality.

Sheep skin parchment:

- excellent - 5%
- above average - 20%
- mediocre - 65%
- poor - 10%

Endleaves are not included in this survey of book parchment because they were often added by the binder and do not form an integral part of the text-block as produced by the scribe. Endleaf parchment was usually selected from manuscript waste or from poor grade sheep parchment of a rather heavy nature, often with much scar tissue. The choice of heavy endleaves was often essential to the structural detail of the bookbinding, and helped to provide the necessary board leverage (explained later in this chapter).
The importance and significance of the quality of skins used can be calculated when the subjects of manuscripts are listed alongside the species of animal skin from which the support is made and the results expressed in percentage terms. If it is accepted that calf parchment was considered a skin worthy of more important manuscripts (it was very much more expensive) the use of different species reveals something of the importance of different subjects as well as of specific books:

**By species - Calf:** Theology - 71%, Devotional 18%, Poetry 3%, Moral Philosophy 3%, Metaphysics 2%, Natural Philosophy 2%, Grammar 1%.

**By species - Sheep:** Theology 44%, Devotional 14%, Poetry 1%, Moral Philosophy 1%, Metaphysics 6%, Natural Philosophy 3%, Grammar 5%, Canon Law 12%, Civil Law 7%, Accounts 6%, Logic 1%.

<table>
<thead>
<tr>
<th>By subject</th>
<th>Sheep %</th>
<th>Calf %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theology</td>
<td>38%</td>
<td>62%</td>
</tr>
<tr>
<td>Devotional</td>
<td>55%</td>
<td>45%</td>
</tr>
<tr>
<td>Poetry</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Moral Philosophy</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>Metaphysics</td>
<td>67%</td>
<td>33%</td>
</tr>
<tr>
<td>Natural Philosophy</td>
<td>57%</td>
<td>43%</td>
</tr>
<tr>
<td>Grammar</td>
<td>89%</td>
<td>11%</td>
</tr>
<tr>
<td>Canon Law</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Civil Law</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Accounts</td>
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</tr>
<tr>
<td>Logic</td>
<td>100%</td>
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</tbody>
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It is obvious that some judgements were made about the different values of subjects, and some secular activities (e.g. accounting) were judged worthy of only sheep parchment, and in many cases paper sufficed. The evidence suggests that sheep skin parchment was considered suitable for a
far wider range of subjects, and was manufactured with less attention to the quality of the pelt used.

Parchment and Paper

In making an assessment of mixed text-blocks it is important to establish that text-blocks are genuinely of mixed origin, and to make a proper and detailed examination of any records before undertaking computer searches based upon data collected over a long period of time.

Text-blocks of parchment and paper during the fifteenth century were generally prepared with the outermost and the innermost fold of the quire being of parchment, but sometimes only the outermost or the innermost fold were of parchment. In the cases of mixed text-blocks there is evidence of a definite transition. The mixed quires with innermost and outermost folds occur mid-fifteenth century, and those with innermost parchment

75 Peterhouse MS 276 is an early fifteenth century Psalter with two bifolia of prayers in English (on paper) of fifteenth century origin. It points up the problem of relying upon computerised records of mixed text-blocks, being unique in this survey but by no means being unique in general terms. It is sad to note that the paper leaves have been moved from the original location between f.16 and f.17 to a new position between f.10 and f.11. This has been done since M. R. James catalogued the manuscript in 1899, when he noted f.16 "Between these two leaves are stitched four small leaves of paper (5 1/2 in X 4) with prayers in English (XV) ..." (James 1899 p.348). The leaves are now tipped into the book elsewhere, and consequently this action has destroyed the original context and integrity of the book. However, the paper leaves do illustrate how a functional book can be adapted very early in its history (and of course possibly later) by the owner to present a different type of text-block, and one which can affect a survey of this type giving a misleading result if not identified as being in a special category.
folds only tend to be found on slightly later manuscripts, and those with no parchment cross the divide, if anything tending to be later. These results are hardly surprising for it has always been commonly suspected that the scribes and bookbinders were initially sceptical about the tensile strength of paper. Perhaps even more conclusive proof of this popular theory's validity is provided by an examination of printed book text-blocks. Those printed books with parchment stays (that is to say strips of parchment, often cut from earlier manuscripts but sometimes plain parchment, pasted and therefore sewn to the inside of the quires and very rarely to outside and inside) were most common in the earliest printed books from the 1470s. By the 1490s, they are comparatively rare. The use of parchment stays is also related to the date when books were bound, for those of early date often have a full stay in the middle of every quire, but as time progresses a less significant gesture is made, with perhaps only the first four or five quires and the last four or five being provided with a stay in a text-block of perhaps thirty quires or more. The binder who was used to parchment text-blocks took some time to adapt to paper.

Parchment stays in books bound in Cambridge during the fifteenth century always appears to be stuck to the spinefold with paste. Paper manuscripts bound in England (but not in Cambridge) were also frequently provided with parchment stays but these were not routinely stuck with paste. Printed books bound in Oxford with stays were sometimes stuck but not as consistently as in Cambridge. The significance of the adhesive may have something to do with the local techniques employed in preparing the text-block for sewing, and one wonders if the act of sticking the stay was regarded as a means of speeding up the sewing.

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76 There is really no explanation for the inclusion of parchment stays in the innermost folds of quires other than as reinforcement's for sewing.

77 Sticking the stay to the paper would not have strengthened the leaf but would in fact have given rise to a potential cutting edge and line of weakness after the book was bound.
Corpus Christi College, Cambridge, MS. 244 is a fairly typical manuscript with a mixed text-block of the mid-fifteenth century. It is a Logica made for school use, and is written in a very ugly and contracted hand presumably by an amateur scribe. The innermost and outermost bifolia are of poor quality sheep parchment, of average 200 microns thickness and with a rough scraped finish. The colour of the parchment is predominantly cream but it is variable across the leaf. The willingness to use paper rather than parchment is shown by the fact that only the first two quires have folds of parchment, whereas the last three are made of paper. This may reflect the comparatively low cost of paper in relation to poor quality sheep parchment. Corpus Christi College, Cambridge, MS. 234, a mid-century copy of Egidius Romanus, is another fairly typical mixed text-block in which the outermost and innermost bifolia of every quire is of mediocre sheep skin parchment, of about average 200 microns thickness, whose surface has obvious signs of the presence of the chalk used in degreasing an obviously poor skin. Corpus Christi College, Cambridge, MS. 235 (Homiliae, mid fifteenth-century) is almost exactly the same in character, except that the parchment has a much more uneven colour differentiation between fleshside and hairside.

The impression must not be given that paper was uniquely associated with poor parchment in the context of the mixed text-block. Gonville and Caius, MS. 223.238, a copy of Dieta Salutis ... of the late fifteenth century, is written in a current but good small hand. The manuscript is in quires of sixteen leaves, the innermost and outermost bifolia of every quire is of parchment. The text-block is of mediocre calf skin parchment of about 150 microns average thickness, with a smooth finish and a good overall white to cream colour. It is slightly lighter in weight than the paper, which averages 180 microns in thickness, being a medieval antique-laid paper

It is not always possible to ascertain if a stay has been stuck or not, because if the adhesive quality has deteriorated the stay may appear to be separate. Therefore in the case of separate stays it is necessary to look for starch deposits.
with no watermark displayed on the cut leaves and sewn with vertical chain lines. In the case of Gonville and Caius MS 376.596, a mid-century copy of *Henrici Daniel liber Urierisiarum* ... etc., the outer bifolium of every quire is of good quality sheep parchment, which has been pounced and rendered smooth with the slightest nap. The parchment leaves average 160 microns, the paper leaves 250 microns, and it is sewn with horizontal chain lines. The inner fold of every quire is lined with a parchment guard about 1/2 inch wide (i.e. full stays)\(^7\). In all cases, including the poorer parchment bifolia, the parchment is folded so that the opening leaf of the fold is arranged hair-side, flesh-side.

Mixed text-blocks arise for a number of reasons, and all of them present the binder with a slightly unusual book to deal with. Peterhouse, MS. 250, for example, is a mixed text-block in which there are two titles bound together. The first title is a late fifteenth century manuscript, *Astrologica*, on mediocre calf skin parchment (of average 140 microns thickness), and the second title is a printed copy on paper (180 microns on average) of Ptolomei *Theorica Planetarum* ... The book is bound in tanned calf skin and in a structural sense exactly resembles a style of binding commonly associated with printed book bindings of the period.

Corpus Christi College, Cambridge MS. 427 (*P. De Ickham, Ric. Cicestrensis, Martinus Polonus, etc*) is also two volumes bound as one, but was rebound in the eighteenth century. There can be little doubt however that the book was always bound as at present, because the original thread impressions on the inner folds of the quires match exactly from quire to quire, and the quire signatures are continuous from one book to the next. In addition,

\(^7\) It was often noticed that the parchment in mixed text-blocks was frequently lighter in weight than the paper used, and no reason for this has become apparent. It suggests that the binder was eager to avoid creating a cutting edge with a heavier parchment, against which the paper leaves would have turned.
there is substantial scribal evidence. The historical texts are relevant to one another and have clearly been brought together as one whole text. This book is interesting because the collation is complex, with mixed quire sizes, and the use of parchment occurs only in selected quires in the middle of book 2 and towards the end. It seems that the mixed scribal origins of the manuscript have led to the use of different materials and to a very unusual physical make up, but the overall make-up of the manuscript was retained by the original scribe of volume 1.

1(8s) (+1*) 2(8s)3(8s)3(8s)4(6s) | 5(10s)6(8s)--11(8s)12(14s) (outer and middle sheets vellum, rest paper)13(10: same construction) 14(10s)15(12s) 16(12s) (wants 12). 14-16 constructed as 12.

Paper

There were two revolutions in book production during the fifteenth century. The most obvious and important change was related to the introduction of printing with movable type. The second, and often forgotten revolution in book production, concerns the use of paper as a major component in book making. The research on the medieval use of paper is still at an early stage, but judging by an examination of datable manuscripts in catalogues describing text-block material, it is clear that about 5% of manuscripts were written on paper in 1400 and by 1450 this had reached 20%. By 1500, this had risen to 50%. The largest increase in the use of paper occurs from about 1450 onwards (Lyall 1989, pp. 11-26).

79 The scribes are mixed but the scribe of book 1 on f.1,2 etc., and in other parts of book 1, is also the scribe of book 2. The quire signatures of books 1 and 2 seem to be by the same hand, and therefore it seems likely that it was this scribe who brought the book together for the first binding.

80 Lyall arrives at these figures in a variety of ways which do not necessarily take account of the more ephemeral materials which may have been on paper for a longer period of time. Certainly, the college lecture and school books of the Germanic world in lang-stitch and ketten-stitch bindings date from the fourteenth century. In the context of this research however, the subject matter is restricted to England and to those books bound between wooden boards.
Clearly, the reason for the rapid increase in the use of paper in the fifteenth century is not solely related to the introduction of printing. Indeed, Lyall’s research is concerned only with the use of paper in the making of manuscripts, and the percentage increases cited refer to that research. It seems that the decisive factor which persuaded more and more scribes to use paper for certain jobs was the cost (by the end of the fourteenth century, a quire of paper (twenty-five sheets) cost no more than the average skin, but it gave eight times as many leaves of the equivalent size (For the price of paper in Paris at the end of the fourteenth century, see Fevre 1990 pp.17-18)). The price of parchment remained fairly constant in spite of the challenge from paper, because it was still required for many classes of manuscript. Liturgical manuscripts continued to be written on parchment, Statutes were written on parchment, but for University purposes paper was felt to be adequate for teaching manuscripts, and the mercantile world seems to have been more open to the use of the cheaper material in the making of manuscripts (Lyall 1989, pp. 11-26). The rapid development of commerce in the second half of the fifteenth century with a parallel increase in the number of legal documents created a critical need for accurate record keeping; and there can be no doubt that the demand for a material which would not be too bulky, nor too expensive and which could be easily handled must have given paper a significant edge.

Lyall is arguing from the perspective of those manuscripts which appear in library catalogues. One guide he uses is the catalogue of datable manuscripts recently compiled by Andrew Watson, which contains 174 manuscripts produced in England during the fifteenth century. He also uses Neil Ker’s Medieval Manuscripts in British Libraries. Lyall creates two charts of English manuscripts, one based upon the collections at the Bodleian Library and the British Library, and the other based upon other libraries’ collections but making an additional distinction for the specific subject of certain books. His findings are largely confirmed by the survey for this research.

Of course printing was a vital factor in the development of the use of paper. Not simply because parchment is not easy to print on, but for the more obvious reason that even a small print run of a printed book would
It has been calculated that the cost of paper fell by 40% during the fifteenth century, whereas the average cost of parchment for the same period rose possibly by a similar amount (Hills 1988 p.2). The ability of the papermakers to keep pace with the demand for production created yet further demand and greater efficiency, leading to further development and expansion. However, John Tate's abortive attempt to build a commercial paper mill in England in the early 1490s nonetheless prove that papermaking was not an industry into which one should move lightly. There is nothing inherently wrong with Tate's paper. (It was used by Caxton and de Worde.) It is rather uneven, and contains a certain amount of grit and impurity, but it stands in good comparison with many other imported papers (Shorter 1971 pp.15-16). The commercial failure of Tate's enterprise was probably due to his inability to compete with the energy and efficiency which a century and more of European production had established previously. Tate had to import the skill of the workmen, he probably had to import rags, and he would have had to employ experts have placed huge demands upon the supply of parchment, and would have made the capital outlay in the printing of a text almost prohibitive.

The fall in the cost of paper is evidenced by the rapid expansion of the industry in response to the introduction of printing. Allan Stevenson has written in some detail about the emergence of new paper mills in France, and about the addition of new vats to established mills. He instances the growth of a paper industry at Basel where the first mill existed in 1433, followed by two more in 1453 and by a further three in 1489. The availability of paper and the rivalry between mills gradually but steadily gave rise to a fall in price. Stevenson analyses fifteenth century paper prices for the Basel mills, but the evidence is to some extent ambiguous (Stevenson 1967 pp.50-53).

The prices of paper and parchment are also recorded in L. Febvre and H. J. Martin (Febvre 1990 pp.17-18).

The trade in rags largely developed in response to the paper industry and as England had no established mills until the sixteenth century there was a shortage of rags (Shorter 1971 p.16).

The fact that the established sixteenth century English paper mills at Fen Ditton near Cambridge 1550-1, at Dartford in Kent 1588, and at Dalry near Edinburgh in the 1590s were all, in part at least, established by men of
from abroad to help design and construct his mill. In the daily running of the skilled labour involved in manufacturing pulp, the repairing of moulds and so forth, he must also have been involved with expensive immigrant labour. Tate was either a brave man or a fool. Working in isolation, albeit with English customers and Royal encouragement, his mill was destined to experience financial difficulties (Shorter 1971 pp.13-18); (Hills 1988 p.6).

The paper of the books surveyed is all of a late medieval antique laid variety, with comparatively widely spaced chain lines (i.e. approximately 35 mm apart or 48 mm apart depending on the type of mould used) (Hills 1988 p.7). It is clearly of rag origin, and on the whole it is tough and durable. Much of the paper stock is mediocre, having in many cases an uneven thickness with some very weak areas evident in certain of the sheets (Corpus EP.G.3 by the Demon Binder, a copy of Boccaccio, Genealogiae deorum, date 1472, has for example reinforcing paper patches over the sewing holes to prevent tear back where the paper is very weak and thin). There are marks of water droplets that have fallen on the sheet whilst still in the mould, causing the characteristic droplet effect. It is interesting to note that the thinner the paper the better the quality tends to be, with far less evidence of imperfections. The paper used in making cheaper manuscripts tends not to have watermarks and one wonders if it was purchased locally by the scribe from a stationer who bought imported Germanic origin strongly suggests that Tate would have employed foreign labour.

Where printed books have been examined the majority are of Continental origin.

The deliberate use of different grades of paper by printers and the indication of this with the printing of sigla in the direction line of the recto is an eighteenth century phenomena. However, it is well known that from the beginning of printing much attention was paid to the use of consistent paper of similar grade. The invention of printing placed considerable strain on the supply of paper and the consequent variety in quality is obvious in any careful examination of early printed book text-blocks (Stevenson 1967 pp.26-71).
working stock for legal, clerical and accounting records; stock used in printing was of a superior grade, purchased from the Continent specifically for printing, and was clearly bought in large quantities. This is obvious from those text-blocks of English printed books which are composed of many different makings of papers. In examining the paper used by Caxton, Lotte Hellinga has described how it is possible, using beta radiography, to trace the use of paper-stocks. The work of Paul Needham in particular has highlighted the complexity of paper usage in the pre-1500 printed book, and the scale of the paper trade can now be appreciated in the context of one printer's workshop (Hellinga 1982 p.53-54). The watermarks were not studied in detail for the purposes of this research, but as one would expect a basic analysis of watermarks using Briquet's catalogue (and without reference to more recent catalogues) suggests that the paper came from mills widely scattered but concentrated largely in France and Italy. Much paper from the region around Troyes was also sent to England through the Netherlands. The watermarks of the bull's head, the unicorn, the letter P, the pot or flagon and of the balance were the most commonly found marks in the printed books of Northern Europe found in the survey. Less commonly observed were the axe, the star and the anchor. The watermarks in common usage are associated with the well-known papermaking areas, which appear to have been adapted to meet the demands of the printers, with lighter sizing and good, even weight. As today, the professional printer was attentive to the quality of paper stocks, seeking evenness in colour, weight and texture. Where mixed paper text-blocks are found, it is interesting to note how well the paper stocks have been selected and matched by the printer. Given the great variation in the stuff of which paper was made, the tremendous variety in sizing, and the fine balance of skills in hand papermaking, this matching was a significant achievement.

The sizing of the papers in the fifteenth century varied somewhat but undoubtedly involved the use of gelatine, and in a few instances there was a suggestion of stone-burnishing with an agate or the like. Fourteenth century papers, especially those from Spain, can have quite a heavy sizing
in wheat starch\textsuperscript{86}. The date at which less heavily sized papers became available to printers in the fifteenth century is uncertain, and the evidence of this survey was inconclusive in this respect, possibly because paper stocks were not necessarily used up in one single print run\textsuperscript{87}.

In the early fifteenth century the paper used in the making of manuscripts has markedly different properties. For example, the paper in the Corpus Christi College, Cambridge MS 171 Scotichronicon (fifteenth century), from the Abbey of Inchcolm, bears a flower watermark and the paper appears on first examination to be burnished. It is comparatively soft (although it has suffered considerably from the ravages of time, damp and mice) and has a polished surface; because the manuscript came from a remote and poor abbey one is tempted to believe that it is from a stock of late fourteenth or early fifteenth century Spanish paper that was starch-sized. However, it turns out to be a paper made in Vicenza around 1429 and is identified by Briquet (Briquet 1968 number 6385). The paper has the characteristic widely spaced chain lines (averaging 38 mm apart) and wire lines at intervals of 1 mm. The paper has a weight of between 250 and 270 microns. Judging by the layout of the text and the evidence of trimming (there are no surviving deckle edges), the sheet size probably equates to that now known as Royal (i.e. 19 X 24 inches) (Hunter 1978 p.138). The

\textsuperscript{86} Starch sizing requires burnishing to consolidate and polish the size in the body of the paper. The process of starch sizing ceased at some point towards the end of the fourteenth century, at the same time that the Italian method of sizing paper with gelatine became more or less universal. Early Italian papers can have a rather streaky finish to them, as though the gelatine were brushed on to the paper and then received a burnishing. It is comparatively easy to distinguish from the stone-burnished starch-sized paper because it has one significantly different characteristic: it is crisper and harder in itself and on its surface.

\textsuperscript{87} Some idea of the range of different papers used in the printing of a major work can be gleaned from a study of the stock used in the printing of the Mainz Catholicon, which included three papers of varying quality. The project involved considerable planning to ensure that adequate paper supplies were in place, and the consequent variation in quality is an interesting observation of the study (Buhler 1987 pp.29-30).
sheet was almost certainly folded once in the middle of its longest edge, and again through the middle of its narrowest edge and after writing was sewn through the centre of the second fold. This has provided leaves with horizontal chain lines, and the trimming has been comparatively slight at the time of its binding and subsequent rebinding. The extant leaves have a dimension of 11.5 X 8.25 inches. When placed in a raking light they show considerable evidence of streaking on the surface of the sheet, but this seems more likely to be due to the primitive application of gelatine (perhaps with a brush) rather than to any form of burnishing. The soft and heavy quality of the paper is in marked contrast to the far more sophisticated papers of the late fifteenth century used for printing. The quires of the manuscript are either ten or eleven to the centre, giving rise to very thick gatherings and providing a textblock suitable for a robust and substantial binding (alas, the original binding has long since been lost). The nature of the support materials for the writing of manuscripts had a profound influence on the type of binding to be produced, and the fact that there are shadows of lacing about the first leaves of the manuscript help us to understand that this was once in a wooden boarded binding. It must have been a very substantial binding - sewn on five stations, the textblock was and is over four inches thick. The fact that it was borrowed by Gilbert Haye, shortly after it was written, leads to the speculation that it may once have had a binding like that of the Haye Manuscript now in the National Library at Edinburgh and which is in the earliest known blind stamped Scottish binding. There is good evidence to suggest that Haye may have been responsible for obtaining the first binding for MS. 17188.

An analysis of paper thicknesses in a sample of 80 paper text-blocks (manuscript and printed book) reveals that:

88 An article by N. Hadgraft, C. Hall and C.A. Porter on the physical evidence relating to MS. 171 is to be published shortly in the new edition of the manuscript edited by Professor D. E. R. Watt (University of Newcastle).
3% of text-blocks  average  110 micron leaf thickness
3% of text-blocks  average  140 micron leaf thickness
24% of text-blocks  average  150 micron leaf thickness
6% of text-blocks  average  180 micron leaf thickness
49% of text-blocks  average  200 micron leaf thickness
6% of text-blocks  average  250 micron leaf thickness
4% of text-blocks  average  300 micron leaf thickness
5% had very mixed paper thicknesses

The variety of paper thicknesses commonly used in paper text-blocks reflects the general pattern for parchment but tends in fifteenth century terms to be a little heavier. By the end of the century the adjustment for the printing press has clearly affected the papermaker's approach, but no correlation could be found between the thickness of the paper and the date of manufacture. The majority of text-blocks of 200 microns thickness (representing the single biggest group) was largely taken from that part of the sample of printed text-blocks, confirming that this was considered a good standard printing paper weight.

Collation

Manuscripts

During the fifteenth century, in contrast with the earlier period, manuscript text-blocks varied far more in collation. Far and away the commonest format in the fifteenth century has the conventional and traditional one of quires in 8s. Of the manuscripts surveyed, those with quires in 8s numbered one hundred and eleven. Forty nine were mixed (i.e. in 8s, 10s, 12s), eight were in 10s, twenty nine were in 12s; three manuscripts were in 16s, one was in 20s, two in 6s and one in 4s. The remainder could not be collated, either because they were too fragile or because they were simply impossible to access. The large but expected
Printed books

Printed book text-blocks on paper seem to follow manuscript collations to some extent but do not mirror them exactly. The largest group is in the same format: forty-three are in 8s, eight are in 6s, nine are in 10s, one is in 12s, six are mixed and twelve are unknown. This is only a small survey, but the figures do seem to represent a trend away from the deeply ingrained traditions of collating in the early medieval period. To what extent this is driven by the versatility of the printing press and the way in which sheet imposition affected collation is not in dispute. Nevertheless the figures show a conscious change in the fifteenth century book (manuscript and printed) and help us to understand what the fifteenth century bookbinder regarded as an average or unusual text-block.

Quire signatures

Manuscript signatures in the fifteenth century were most commonly placed to the right hand side of the leaf, where they could best be seen. They were usually written in the same ink as that used for the body of the text itself but this was not always the case. The signatures would generally appear well away from the body of the text, and were frequently intentionally trimmed away entirely on many leaves. The signature itself more often than not follows the convention of using a letter (mostly lower case) followed by a Roman numeral, but there are many examples of the use of Arabic numerals, and in some cases Greek letter forms have been used. It is not uncommon to find more than one set of signatures in a book which has never been rebound, and it seems that this may be

89 The size of the sample remains a matter of concern, but the selection of the text-blocks studied is very mixed being drawn from many European presses and in this respect it seems likely that it is reasonably representative.
associated with different functions and the different purposes of individual craftsmen. In one Gonville and Caius manuscript (MS. 56.33) there are oddly-coloured leaf signatures in blue, which are the same as, but quite independent from, the main black ink signatures. In this case, many signatures in the blue sequence have obviously been lost in trimming or were only ever intended for the preliminaries and other special leaves. (Perhaps certain leaves requiring additional decoration were marked either by the rubricator himself or by an apprentice.) The signing is sometimes accompanied by the addition of a cross at the tail edge below the text and in the centre of the leaf, indicating that the quire is complete. Occasionally the recto of the second leaf of the central bifolium is signed at the tail fore-edge, again presumably to indicate a complete quire. The mark on the leaf beyond the centre also provided the sewer with a useful reference point, though this was coincidental.

The convention of whole quire signatures on the verso of the final leaf of each quire (usually positioned mid-way across the width of the leaf in the tail margin) continued into the fifteenth century, and this was presumably still used to speed collation of the book prior to binding.

The first printed 'signatures' were used by Koehoff the Elder at Cologne in an edition of Nider's Praeceptorium Divinae Legis in 1472 (Greenhood 1936).

The signatures in the printed books observed followed closely the most common manuscript convention - using a single letter and Roman numeral to the centre of the quire, often signing one leaf beyond the centre itself (i.e. to leaf five of an eight leaf quire) thereby revealing the central fold of the quire itself. Most manuscripts of much earlier date are signed to this leaf, and the need for quick and accurate collation at all stages of the production has to be the favoured explanation; although this may also have been, by coincidence, an easy way of checking the opening for sewing. The quire signatures in the incunabula books observed in the survey were mainly of the printed variety (although there were several books with hand-written signing: Corpus EP.G.3 and EP.H.1 for example) which
commonly appeared immediately beneath the text and were right justified. The quire signatures in the incunabula books observed in the survey were mainly of the printed variety (although there were several books with hand-written signing: Corpus EP.G.3 and EP.H.1 for example) which commonly appeared immediately beneath the text and were right justified. This right justification occurred regardless of whether the text was in one or more columns. (See Corpus EP-D-1, EP-D-4, EP-C-9, EP-D-7). The printed signature, once introduced successfully, was aligned with and centred immediately below the body of the text. One book with examples of the doomed (because they were so easily broken) printed signatures away from the direction line and the body of the text, towards the tail edge margin, and right justified, were observed where trimming had failed to remove them. (see Pembroke College C 15, Albertus Magnus, De Officio Missae ..., Pr. Joh. Gulsenschiefl, 1477).

Endleaves

The parchment used as endleaves for many of the printed books was extremely coarse and thick. A typical weight for endleaf material of this type is 1,000 microns. The parchment tended to be deep yellow to brown in colour. It commonly has scar tissue, is very rough in character with crude scraping marks. The binder has often slashed the parchment in an irregular fashion to make it adhere to the board, when bubbles appeared at the time of pasting down. Such endleaves are usually in the format of a single fold, sewn to the text-block separately. A similar type of parchment is found as endleaves on manuscripts, though less commonly. The use of the material is not a sign of poor workmanship or of work from a cheap workshop. Caxton's binder used material of this sort as endsheets in the Corpus Christi Cambridge copy of Lyndwode's Provinciale printed by Theodoric Rood (EP-M-7). It seems that endsheets were not important in

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90 The convention of using printed signatures is generally attributed to Zarot, of Milan, 1470; but it has also been suggested that John Koelhoff, of Cologne, in 1472, was responsible.
the aesthetic sense, for one can find examples of this sort of material on some very fine manuscripts with fine and beautifully illuminated parchment. The consideration must have been the weight of the material necessary to provide sufficient board leverage to give the desired opening characteristics of the binding.

Of the 224 manuscript bookbindings surveyed, 62 had either lost their original endleaves or they had been so mutilated as to provide no useful structural evidence, but in some cases, they did retain fragmentary evidence of materials. The remaining 162 ends provided good structural evidence.

The distinction between the work of the binder and that of the scribe is very clear in the fifteenth century. In general, during the Romanesque period the manuscripts had integral endleaves sewn in with the first and last leaves of the first and last quires. However, towards the end of the twelfth century some manuscripts have separate endleaves, and these may be the first examples of lay bookbinding work. In the fifteenth century sample, 126 manuscripts did not have integral endleaves, 22 were mixed (in these cases the lower endleaves were often integral because the text ended before the end of the last quire giving the binder an opportunity to save on valuable materials by utilising the blank leaves at the end of the book). In the fifteenth century survey, 14 manuscripts had deliberately made integral endleaves, and this seems to be associated with books having a monastic provenance. That is, they were made in a monastic setting or town, rather than in one of the University cities or in London. (In printed books, the endleaves are never integral with the text and have always been added in parchment).

The use of medieval manuscript fragments in the making of endleaves was observed in 46 bindings, which suggests that the availability of such material was both widespread and common. The fragments commonly

91 I have no records for the fourteenth century.
dated from the thirteenth and fourteenth centuries, none found was earlier, and the most common texts were either Canon Law or liturgical polyphony. There were a number of examples of fifteenth century texts which for some reason had never been completed by the scribe, and were thus discarded as waste and used as binding material. The largest proportion of books, however, had clean parchment ends and these numbered 139. The remainder of the sample could not be identified. The parchment used in the ends, when drawn from clean stock, was frequently of a poorer grade than that used in the body of the text and would very likely be of a different animal species (e.g. sheep parchment on a calf skin text-block).

The format of endleaves is often difficult to assess, because they are notoriously susceptible to plundering, and to excising as a means of deliberately removing previous ownership evidence. A rough trimmed stub may be evidence of a later removal of a leaf, or, judging by the quality of some fifteenth century work, it may be a contemporary economy measure which gives rise to uncertainty.

The most common endleaf construction in fifteenth century manuscripts and printed books is a straightforward single bifolium of parchment, the first leaf of which has been pasted down. In general, all endleaves were of parchment. In a few cases, mixed endsheets were found but these were always considered suspect because one could never be sure that they had not been altered at a later date in the course of repair. This can be expressed in a formula as F (for the fold of parchment) p (for the pasting-down of the first leaf) and 1 to signify the number of bifolia - hence, Fp1. The second commonest was Fp2, in which there were two rather than one bifolia to the endleaves. The presence of an H signifies that a leaf has been hooked and is only a leaf with a stub as opposed to a full bifolium. G signifies the presence of a parchment guard as opposed to a hooked leaf or bifolium. The use of formulae like this enables one to interpret in short-hand the construction of the endleaves. (I am grateful to Nicholas Pickwoad for introducing me to his code upon which this one is based. The essential
difference between this one and his, is the fact that he labels predetermined diagrams whereas mine cumulates the data in a form that can be read and added to, in order to deal with ever more complex constructions.)

Manuscripts

<table>
<thead>
<tr>
<th>Front Endleaves</th>
<th>Back Endleaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>47 Fp1</td>
<td>29 Fp1</td>
</tr>
<tr>
<td>6 Fp1H1</td>
<td>5 Fp3</td>
</tr>
<tr>
<td>32 Fp2</td>
<td>30 Fp2</td>
</tr>
<tr>
<td>9 Hp1</td>
<td>2 Fp1H1</td>
</tr>
<tr>
<td>9 Hp2F1</td>
<td>1 Fp1H1F2</td>
</tr>
<tr>
<td>2 Hp2F2</td>
<td>2 Fp2H1</td>
</tr>
<tr>
<td>1 Fp6</td>
<td>5 Fp4</td>
</tr>
<tr>
<td>1 Fp1H2</td>
<td></td>
</tr>
</tbody>
</table>

To what extent some of the unusual constructions are the result of later damage is very difficult to tell. It is perfectly clear that the very straightforward bifolia are undisturbed and original, and it is also hardly surprising that the lower endleaves with numerous bifolia (e.g. Fp4, Fp6, Fp3 etc) are all integral with the text-block.

The formats for printed books are very similar, and the binder seems to be continuing a tradition of using parchment ends to assist with good board leverage and for adequate strength and support in the joint area.

Unfortunately because so many printed books were bound in tanned calf skin the leather has frequently deteriorated. This has led to the re-backing of many books, with resulting damage and loss of many endleaves, a feature associated with poor quality modern bookbinding work. In the survey of printed books only 54 provided good evidence of endleaf construction and materials used. The interesting feature of this is the continuation of the general use of parchment, tempered with an increased willingness to include paper in the endleaves.
Three books had what appeared to be entirely contemporary and undamaged paper endleaves. Seventeen books had endleaves made in part or in whole from mediaeval manuscript leaves dating from the thirteenth, fourteenth and fifteenth centuries. 23 books had new parchment endleaves, frequently made of heavy low grade sheep parchment with much scar tissue and flay holes. This familiar parchment was often dark yellow to brown in colour. 11 books had a mixture of parchment and paper endleaves. 47 of the endleaves were not integral to the text and 7 were integral in the sewing of the first and last quires (in these latter cases they were hooked in one way or another around the printed leaves - examples of which can be seen below).

Printed Books

<table>
<thead>
<tr>
<th>Front Endleaves</th>
<th>Back Endleaves</th>
</tr>
</thead>
<tbody>
<tr>
<td>27 Fp1</td>
<td>24 Fp1</td>
</tr>
<tr>
<td>21 Fp2</td>
<td>21 Fp2</td>
</tr>
<tr>
<td>3 Hp1F1</td>
<td>3 Hp1F3</td>
</tr>
<tr>
<td>1 H1</td>
<td>1 Hp1H1</td>
</tr>
<tr>
<td>2 Hp1F4</td>
<td>1 Hp1H1F4</td>
</tr>
<tr>
<td>1 Hp1F5</td>
<td>1 Hp2</td>
</tr>
<tr>
<td>1 Hp1G1F5</td>
<td></td>
</tr>
</tbody>
</table>

The continuity of everyday bookbinding technique between manuscript and printed book is clear in a structural sense, but the overall trend observed in the examination of endleaves suggests that there was a tendency to be more economical with parchment towards the end of the fifteenth century. This is not to suggest that the printed book was treated differently from the manuscript, rather that both types of text would receive relatively less extensive endleaves from 1470 onwards compared to the first fifty years or so of the century. The Fp1 type of endleaf can be found on books dating from 1400 onwards (and doubtless before) but the Fp2 type of endleaves are more commonly found in the mid-century period and earlier (naturally there are exceptions to this).
Primary Sewing

For the most part, it appears that English fifteenth century books were sewn on the frame with no pre-piercing; however, a number of book show knife cuts in the backs of the quire folds which do correspond to pre-piercing in that this has provided the sewer with a hole to work to. Pre-knifing tends to be associated with paper text-blocks in the second half of the fifteenth century, becoming rather more common in the printed book age. This knifing to locate sewing stations had precedents, but reflects a revival of an earlier technique. In the very early period, knife cuts took over from the 'V' cuts associated with chain stitch. Norman knifing could be deep, but crude knifing tends to be associated with the later medieval period. In the late medieval period in England, deep knife cuts were not observed in any of the books surveyed\(^{92}\), and in 90% of cases the sewing was achieved in the absence of any pre-knifing or of any lace pricking (i.e. when a pricking marks the location of the sewing support throughout the quire thereby locating the station on the inside of the fold)\(^{93}\). English fifteenth century knifing appears, on the evidence of the survey, to have been very light and shallow, and is associated with the paper text-block rather than with the parchment one.

Thread

A study of the thread used in the sewing of books can reveal a great deal about the work of the bookbinder. Analysis of thread used in the fifteenth century provides a complex picture of the changing use of materials, and of their modification by the individual craftsman. Understanding the

\(^{92}\) Manuscripts on parchment in Iceland and probably sewn elsewhere in Scandinavia during the fifteenth century did have deep knife cuts, and such knifing is recognised elsewhere in Europe throughout the medieval period.

\(^{93}\) The term "lace pricking" was invented by Nicholas Pickwoad whilst surveying the Ramey Collection, and the practice is commonly found in the post-medieval period.
species of plant which is used as the roved fibre from which the thread is spun can help to suggest the original source of the thread. If significantly changed from one period to another, it may indicate availability of new supplies. It may also reveal a desire to alter technique to meet the changing nature of the text-blocks placed before the bookbinder. It can also suggest possible economies in the purchase of materials as the impact of printing began to be felt. The use of hard or soft threads and the torsion of the thread used can reveal the extent to which the binder was conscious of the cutting risk of the thread used. The twist pattern of the thread used can help the binding historian to understand the sewing structure of the book, making it easier to understand and differentiate between the main sewing of the book and that of the endband. It can also reveal, in special circumstances, whether two or more books were sewn one after another.\textsuperscript{94} The choice of thread weight helps the historian to understand what adjustments were made between endband and main sewing, revealing the difficulties experienced in sewing endbands with multiple tie-downs. The presence of multiple threads in the sewing of endbands can provide an indication of shortcuts adopted in the sewing of the endband. The use of complex threads with more than one thread cabled and waxed with others may provide evidence of the binder adapting his materials to suit the needs of individual artefacts. The use of fine threads in a situation where a heavier thread would have been more appropriate can provide one indication of cheaper work, driven by haste, where stock items are used simply because they are ready to hand. Waxing and sizing of threads may indicate an extra sophistication in the manufacture or use of the thread.

The limitations of relying upon thread evidence relate to the expertise required to study plant fibres analytically. Very powerful microscopes are required for analysis. The analysis of the more obvious features of evidence provided by thread, such as twist direction, can only be accurately assessed often if a sample is available. Simple twists can be assessed

\textsuperscript{94} Pembroke MSS. 250, 251, 251a.
visually, but a thread which has been re-plied can be very difficult to assess without unwinding. Drying twist tests to analyse fibre sources also require sampling which is usually unacceptable. Whilst textile historians and conservators are making great strides in understanding flax and hemp, a great deal of additional work is still needed. Whilst the work on threads offers a very promising reserve of new and exciting evidence, it cannot be relied upon in isolation, as with most specific details.

Approximately 99% of the books surveyed were sewn with either linen or hemp thread. A tiny proportion were sewn with silk. No other fibres were available for making thread in the fifteenth century. Scrutinising sewing threads will not reveal the species of plant used in the manufacture of the thread. By undertaking thread twist analysis more detail can be obtained, and visual analysis will rule out some alternatives given an understanding of the history of thread.

Flax was probably the first plant fibre to be used in the manufacture of textiles. The earliest known examples of its use are in the linen mummy-cloths which have been identified as being more than 4,500 years old. (Tandem accelerator dating, available at the University of Oxford, is probably the most advanced and accurate method of assessing the age of textiles, but it is costly and its absolute reliability is still not fully known (Munksgaard 1987 pp.211-214)). The fibre comes from the stem of an annual plant Linum usitatissimum. The inner bark of the plant contains long, thick and strong walled cells of which the fibre strands are composed. The versatility of flax fibre and the fact that it can be made into linen

95 The samples used in undertaking this research were available where books receiving conservation offered stray ends of thread left by previous generations of repairers who not infrequently excised endsheets leaving the thread which once held them in the gutter of the joint. No sampling of threads is ever acceptable which may weaken a sewing structure, and must never be permitted.
makes it the most important of the bast fibres\textsuperscript{96}. When linen has been pounded, it can produce a very fine material with a sheen and appearance much admired and in demand. Whilst it is difficult to distinguish hemp from flax fibres, it is less difficult to recognise good linen.

It is not surprising to find the widespread use of hemp threads in the sewing of books, because until the late nineteenth century the crop \textit{Cannabis sativa} was the world's largest fibre crop. In recent tests carried out on the silt found in the bottom of a number of ponds in various parts of the United kingdom the high incidence of hemp pollen has been noted, and it is quite obvious that hemp was very widely grown. The fibres would have been used in the manufacture of thread for fabrics, canvas, clothes, rope, nets and so on. It is a strong bast fibre and provides an alternative source of fibre to flax. The bast fibres form bundles or strands that act as hawsers in the fibrous layer beneath the bark of the plant, and help to hold the plant erect. The strands of bast fibres are normally released from the cellular and woody tissue of the stem by a process of natural decomposition called retting (i.e. controlled rotting). Often, the strands are used commercially without separating the individual fibres one from another. The \textit{Cannabis sativa} plant produces a fibre which in certain circumstances is better than that of flax. Hemp fibres are even more water resistant than flax fibres, and are therefore preferred for sailcloths, caulking and many nautical uses. Hence, wherever there are boats and navies or fishing fleets one is likely to find the crop being grown. Ancient records describe the use of hemp in China in 2,800 B.C. During the early Christian era, production of hemp spread quickly and it was soon in widespread use throughout the countries of Mediterranean Europe. From there the fibre

\textsuperscript{96} The term 'bast' is synonymous with phloem, the food conducting tissue of vascular plants. In a broad commercial sense, the term "bast fibre" is used to denote fibres obtained from the cortex and pericycle in addition to the phloem. The bast fibres are obtained from the stems of dicotyledonous plants and are often referred to in the trade as 'soft' fibres, to distinguish them from the 'hard' fibres obtained from monocotyledons (Textile 1985 p.15).
travelled north and thence across the world. Precisely when it became established as a crop in northern Europe is uncertain, but there is clear evidence from pollen samples that it was in common use from a very early date (Rackham 1994).

The sewing threads used during the fifteenth century show a good deal of variation in colour. The thread used for the main sewing was normally undyed, and colour variations based upon brown suggested that the thread may be classed accordingly light (variations on white), medium (variations on a neutral beige) and dark (brown). The majority of books (approximately 52%), were sewn with a medium thread, although a very substantial proportion (approximately 34%), were sewn with a light thread, and the remainder (14%), were sewn with what appeared to be a medium thread. It is interesting to note that the greatest variety in colour variation, from ozone bleaching of fibres, can be seen in flax-based thread, as opposed to hemp which is far more consistently un-bleached97. Hemp is more difficult than flax to bleach naturally and it has an inherently darker colour (Gordon Cook 1993 pp.17-18). Hemp is also, in general, a coarser fibre than flax. These latter factors cannot be relied upon as a means of identification, but they can be used to confirm more careful assessments of the materials.

Archaeological work has shown that the drying twists of flax and hemp fibres are contrary to one another. The cellular configuration of the majority of spiral elements (fibrils) in the outer spiral cell wall of the two plants is in the opposite direction, which when viewed from the top gives rise to a clockwise drying twist in one plant, flax, and counter-clockwise in

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97 Chlorine bleaching was not introduced until the eighteenth century, but the use of ozone bleaching was known and may help to account for the wide colour variation in flax threads observed in this survey.

In papermaking bleaching was not introduced until the early nineteenth century, which accounts for the fact that paper always assumes the tone of that from which it was made. The qualities of the water also had a
the other plant, hemp (Newman 1954 pp.113-117). Newman and Riddell advocate the sampling of five strands of fibre about 8 cms long. Held between the tip of the forefinger and thumb of one hand, having damped them briefly, the sample is held in front of a sheet of black paper so that the tips of the fibre can be observed clearly. First, one sees the wetting twist which is contrary to the drying twist, and after a few seconds the tips of the fibres can be seen to twist in the opposite direction - the drying twist. (This is a very crude method of analysing fibres, but does give a fairly good indication of the type of fibre being used as a base material for the threads observed). It has been recognised for some time that flax was used as a material for the manufacture of bookbinding thread, but the use of hemp was less commonly recognised. Petherbridge's attention to this detail and his understanding of its significance in book structures is the first reference, to my knowledge (Petherbridge 1997). More scientific approaches to the analysis of threads can be achieved with the use of the microscope and the electron scanning microscope. In analysing degraded fibres it is important to pay attention to the morphology of fibres, and to recognise that the different sources degrade in different ways (Cooke 1987 pp.215-226).

It was possible to undertake drying twist tests only on a relatively small sample of the fifteenth century surveyed books. It would appear that approximately 80 % of books were sewn with linen thread and 20% with hemp thread. The sample analysed for thread types numbered 150 (110 of which were manuscripts and the remainder of which were printed books in wooden boarded bindings). The sample is very small and one can only tentatively suggest that it may be implying a trend rather than proving anything definite. The really significant feature of the variety of species observed concerns the dating of the use of the different thread types. The use of linen thread is more or less constant throughout the fifteenth century, whereas the use of hemp threads is concentrated very heavily

profound effect upon the colours of vegetable fibres and therefore have a marked effect upon the colour of both paper and threads.
towards the end of the century. The use of hemp is particularly associated with the sewing of printed books, and of a few manuscripts bound in a way which makes them outwardly resemble a late fifteenth century printed book in tanned calf skin with blind tooling. The fact that the printed book initially represented an additional source of books for binding, meant that the level of usage of linen thread was not significantly affected by the greater use of hemp thread.

The hemp threads studied tended to have soft to medium torsion, whereas the flax tended to have a medium to hard torsion. The sample also revealed that the addition of beeswax to consolidate the thread was in general more likely in a flax thread rather than a hemp thread. Could it be that the binders recognised that the hemp fibre threads, whilst being composed of a coarser base fibre, were nonetheless softer and more forgiving, and hence believed them less likely to cut the paper leaves of printed books? Flax thread continued to be almost universally used on parchment-leaved books and was also widely used in sewing paper-leaved books, but the theory concerning the increase in the use of hemp fibre towards the end of the fifteenth century still seems more realistic than any idea based upon shortages or cheapness of materials. The use of hemp was identified in books surveyed for this thesis from the earlier decades of the century, but not in the same quantity as observed from 1480 onwards.

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Hemp</th>
<th>Flax</th>
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<tbody>
<tr>
<td>1400-1425</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>1425-1450</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>1450-1475</td>
<td>9</td>
<td>32</td>
</tr>
<tr>
<td>1475-1500</td>
<td>22</td>
<td>33</td>
</tr>
</tbody>
</table>

Thread twists

Refer to Diagrams - Sewing A6 - Thread: Twist and Cabling

The manufacture of thread involves the drawing and twisting of the fibres, it can be a simultaneous process or it can be independent. The drawing of the fibre involves pulling it in such a way as to arrange the
fibres longitudinally and in parallel, so that they are more or less in order (described at this stage as being roved fibres). By twisting the fibres the irregularities in the surfaces are brought into intimate contact and effectively pressed to one another; it is this twisting action which makes the thread one entity. The twisting is, of course, achieved by spinning, and the degree of torsion in the spun thread will determine the elasticity and strength. The twist can be in one direction only - according to the direction in which it is spun, and it is this feature which determines whether or not the thread is Z twisted or S twisted. The normal rotation of a spinning wheel is clockwise and this provides an S twist thread (Patterson 1954 pp.202,646)98. It may be reasonable to suggest that threads having a Z twisted ply were spun on a distaff, but the reverse is certainly not true, for S twist ply twisted Z are as likely to have been spun upon either wheel or distaff. It would be necessary to have detailed records of many thousands of thread twist directions for the whole period of the Middle Ages to determine whether or not the spinning wheel did have a marked effect upon twist directions. But early findings of the survey of fifteenth century book threads suggest it may have had some effect, especially with the very high incidence of complex threads throughout the period. The first known depiction of a spindle wheel dates from the early fourteenth century (Luttrell Psalter, 1338). The use of the spinning wheel is mentioned from the first half of the thirteenth century onwards, and is frequently depicted in stained glass, as at Chartres (thirteenth century) as well as in manuscripts. The spindle and distaff did however remain in heavy use throughout the Middle Ages as evidenced by many depictions of its use (e.g. in a French fourteenth century manuscript copy of the works of Aristotle.)(Patterson 1954 pp.201-205) (Gille 1954 pp.644-646)99.


99 It has been said that the spinning wheel was a comparative rarity almost to the end of the Middle Ages (Gille 1954 p.644), but judging by the numbers of times that it is observed in drawings and illustrations it seems likely that there were significant numbers in use by the fifteenth century.
A single-ply thread is one composed of a single thread of fibres twisted in one direction. Most threads are plied, that is, two or more single threads are twisted together; thus there are two-ply threads (i.e. 2\(z\)S), three ply threads and more. Plied threads can also be twisted to form complex threads (e.g. 2 of 2\(z\)S twisted \(Z\)). Where it appears that there are threads composed of more than three strands, it is unlikely that this has been achieved without the assistance of some type of spinning wheel (except, in bookbinding at least, where the twist is so soft as to suggest that it may have been achieved on the needle whilst the book was being sewn) (Laughlin 1954 p. 1096). (For heavier rope cordage definitions see: Keith A. Dixon's work (Dixon 1957 pp.135,136)).

'Twist' is the turns about the axis of the thread observed in a fibre, thread or cord' (Laughlin 1954 pp.1096-1099). The degree of twist can be established from the helix angle, and this is a positive indicator of the torsion. Up to 20 degrees is soft, between 20 and 30 degrees is medium, between 30 and 50 degrees is hard, 50 to 70 degrees very hard.

The twist used in making the threads seems to have been largely unaffected by the species of the plant fibre used, and is also unaffected by the date at which it was made. There was clearly a dominant twist direction, which was probably largely determined by the handedness (i.e. right or left) of the spinner (i.e. right handed or left handed) or by the dominant action of the spinning wheel.

Analysis of twist direction in 223 fifteenth century bookbindings

<table>
<thead>
<tr>
<th></th>
<th>(Z) twist</th>
<th>(S) twist</th>
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</thead>
<tbody>
<tr>
<td>1400 - 1425</td>
<td>9</td>
<td>45</td>
</tr>
<tr>
<td>1425 - 1475</td>
<td>25</td>
<td>71</td>
</tr>
<tr>
<td>1475 - 1500</td>
<td>10</td>
<td>63</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>44</strong></td>
<td><strong>179</strong></td>
</tr>
</tbody>
</table>
Number of manuscripts and printed books with complex thread structures observed in fifteenth century survey (approximately 35% of sample).

During the survey of the threads in the fifteenth century books it was noticed that many of them had quite complex thread construction being composed of several strands of twisted threads. In a fifteenth century French manuscript there is a drawing of a crank-rotated machine for spinning cord for snares, and one imagines that the spinning of complex threads of flax or hemp may well have been achieved with similar machines (Gille 1954 p.646). Certainly the consistency of twisting observed in the books suggests a certain degree of mechanical operation, as does the complex construction of threads in such a large proportion of the sample.

The degree of torsion given to the thread was usually medium to tight\(^{100}\) providing a strong, hard and well compacted thread which very often had a consolidating modification of beeswax added by the bookbinder.

The twist direction of threads can be very helpful in studying the work of the bookbinder. For example, one often notices that the direction of the twist of thread used in the main sewing may be different from that used in the sewing of the endband, and this is usually accompanied by a change in the thickness of the thread being used, as the sewer of the endband adjusts to accommodate the special requirements of a densely sewn structure upon which a decorative secondary sewing will often have to be formed.

In some cases, proof of work by the same bookbinder can be established from the thread alone. In Pembroke MSS. 250, 250a, 251 (Philippus de Monte Casterio c. 1450, for example, the thread used to sew three volumes of the same text is complex and has been twisted, probably on the needle, to make extra thickness for the large format and heavy quires. Three threads of a standard 2zS flax thread of medium torsion have been wound

\(^{100}\) Torsion was measured as an angle of twist against the line of the thread, and as described in Technical Notes (Laughlin 1954).
(most likely on the needle) to give an overall soft Z twist. The three independent threads are very clear, but after Z twisting have been treated as one entity for sewing purposes. The thread is the same in all three volumes, but the covering skins for the bindings are different as are other characteristics of the bindings. It may perhaps seem obvious that these books were all bound together, but one could easily be misled by textual evidence alone. The production of a manuscript of this scale may have taken some time, and could have been bound in stages. The presence of a primary cover to one volume in a different colour from the other two may well imply a staggered production, rather than the running out of a material; but on the other hand the presence of a very unusual thread for the sewing of all three volumes, with a consistent and unmistakable soft twist almost certainly created by the sewer of the books, very strongly suggests that the volumes were all sewn in succession.

Sewing Supports

The sewing supports provided for books in the fifteenth century were usually of alum tawed skin, but a significant minority were of tanned leather. The vast majority of books were sewn on double supports, but a small number were sewn double-hole in a style sometimes associated with Flanders, on single and sometimes double bands, as noted in the description of the Jesus College prayer book. From a sample of 245 books (where evidence was clear), only 12 were on single raised supports, 233 were on double raised supports.

Sewing supports were usually of medium thickness, that is to say they were cut from a piece of tawed or tanned skin which averaged 2.5 mm thickness. A number of supports were observed which were considerably thicker, at approximately 3 to 3.5 mm. A rather smaller proportion had supports which were cut from skin or leather with a calliper of 1.5 to 2 mm. The sample of fifteenth century books in which it was possible to observe this feature with accuracy can be divided as follows: 75.5% medium, 16% thick and 9% thin. The weight of the supports used does not necessarily relate to the size of the book involved.
In general, the width of the bands cut prior to slitting for double supports varies surprisingly little from one book to another, regardless of the size of the volume. In a small book (198 mm high) such as the record of the East Field Terrier doubtless bound in Cambridge for Corpus Christi College, Archives XVII 4/5, the four medium-weight thongs are formed from a band approximately 8 mm in width, and in the Gonville and Caius MS. 56.33, a manuscript of Reductorium morale cum bona tabula ... (also probably bound in Cambridge at the same date and bound in much the same style) at nearly twice the height (327 mm), the six sewing supports are of similar dimension.

Supports seem to have been cut from sources of material readily at hand. It is possible that the heavy tawed supports found on some of the books relate to the presence in the workshop of tawed skins for the making of large and robust chemises, whereas the thinner supports may have come from scraps of off-cuts of primary covering material\(^\text{101}\). It is also noteworthy that tanned supports are never found on bindings with tawed covers, although the reverse is not at all uncommon. It would appear that the binders were, in general, aware of the inherent limitations of oak bark tanned leather (notably its lack of permanence) and preferred to use tawed skin for supports. It also seems likely that a number of heavier skins of leather or tawed skin were purchased for specialist binding work, such as the provision of sewing support material and of leather or skin to make bands. The leather and skin used in making supports and bands is nearly always a little heavier than the average primary covering materials, and must have been sorted for its above-average weight. That these structural

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\(^{101}\) The use of the term "off cut" requires some clarification. It is undoubtedly true that small pieces of alum tawed skin cut away at the time of making a chemise may have been reserved for use in making bands, and in this sense an off cut may have been used. But the early fifteenth century craftsman, in common with his predecessors, was careful to select a material of the correct weight as a sewing support and was thoughtful in his choice of materials. It is only at the end of the century
parts of bindings could be made from off-cuts must have been clearly recognised by earlier craftsmen just as it is today. In the survey, no direct evidence was found of the purchasing of off-cuts from other trades, but there can be little doubt that the cordwainers, saddlers and other allied trades would have sold off-cuts for such purposes in the fifteenth century. The picture of urban life with trades working in close proximity such as that described for Cat Street in Oxford and Paternoster Row in Westminster supports this speculation.

The use of tanned supports appears to run in parallel with the binding of books with tanned calf covers. In the survey tanned supports first appear towards the end of the 1460s (20% of books are sewn with tanned supports), and were more frequently used for the remainder of the century. (In 1490 of the sample of books studied 60% were sewn on tanned supports). One is tempted to suggest that the switch to the use of tanned covering materials led the binder away from the sources of tawed skin, and when purchasing from the tanner he simply ordered leather shaved at different thicknesses, thereby obtaining a source for his supports and covers. This may have been the case in some instances, but it seems an unlikely explanation in general. More probably the pressure to deal with the increased demand led the binders to modify their techniques, and to go to less trouble with detail. Indeed, it could be, that the relatively quick failure of tanned support materials could have led the sixteenth century binder to seek out a supply of tawed off-cuts as a source of sewing supports for his workshop, which had become largely dependent upon tanned leather. Whereas the fifteenth century binder sometimes allowed tanned support material to be used after the workshop had effectively ceased using tawed skin.

that one finds the true use of off-cuts with what appears to be the use of materials readily at hand for the making of bands.

102 At this point in the survey the number of printed books in blind tooled tanned calf bindings represents the largest proportion of books studied,
It is interesting to observe how an apparent change in fashion affected not only the outward appearance of the artefact but also the structural composition. The use of tanned support materials is associated with the arrival of the printed book, and with the development of a fashion for binding books in a particular style with tanned calf covering, often with blind tooling. A more interesting feature of this development concerns the use of the same style and structure in manuscripts which were treated in some workshops in exactly the same way as printed books. Caxton's binder, for example, bound an admittedly small but thick text-block on tanned supports and used an abbreviated form of pack sewing to do so, i.e. half-pack sewing. It has been suggested by some modern bookbinding historians that this is not surprising\textsuperscript{103}, but the fact that many late fifteenth century manuscripts were not bound in this way surely suggests that other bookbinders took a more conservative view, and continued to bind parchment text-blocks in the traditional way and with a clearer understanding of the qualities of the materials used.

Pre-formed thongs

The treatment of the support material prior to the actual sewing is of considerable interest. The practice of pre-forming the thongs by passing the ends of the slit material through itself, thereby creating a double parallel spiral of skin around and through which the sewing is passed, tells us a good deal about sewing technique. Firstly, it reveals that the supports must have been pre-slit and turned-in upon themselves before attachment to the sewing frame. This means that the sewer is dependent upon a judgement of how thick the text-block will be at the spine edge after sewing and allowing for consolidation (consolidation is sometimes

\textsuperscript{103} Many modern historians of bookbinding regard the adoption of the decorative tanned binding as a continuation of the basic medieval structure given a different outward appearance. Preoccupation with decorative features has led to a failure to recognise the underlying changes.
achieved today with the use of sewing sticks pressed against the sewing edge after each passing of the thread, but there is no contemporary evidence to suggest that these were used). It is not uncommon to find the ends of slits pulled into the lacing channels of the boards. This is one indication of whether or not the band was pre-fabricated - as one of a number - or was tailor-made. The slitting of the support upon the frame has sometimes been suggested by modern historians, but this would have been impractical because a knife would have tended to wander and it is very unlikely it was ever used as a regular technique. It is possible to turn-in the band in a second way, by leaving one end of the double slit-thong open, and by twisting the two elements against the closed end. When the twist in both elements of a double thong is similar, this must have been the way that the band was formed. The emergence of large numbers of thongs with similar twist at a given date would tend to indicate that once again large numbers of bands were being cut out for the workshop, a sign of greater haste in production. Insufficient numbers of bands were observable in the survey of books to make a meaningful assessment of this phenomena, but a recent investigation of bindings suggests that numbers formed in this way do increase towards the end of the century\textsuperscript{104}.

It is difficult to make definite historical assertions based on limited samples, but, one can establish possible patterns, further verification should be based upon a much wider sample both of specific binders from known workshops, and from the great pool of fifteenth century books in general. The central purpose here, is to outline an approach to analysing the bindings and to indicate a likely historical trend.

\textsuperscript{104} Of thirty early printed books in the Cambridge colleges with double turned-in bands, investigated solely for this phenomena, five had indications that pre-forming occurred with open-ended slit tawed material, whereas twenty five were of the conventional type, with both ends turned-in. In the early fifteenth century no open-ended pre-formed thongs were observed in a sample of one hundred books.
The question arises as to why binders felt it necessary to go to the extra trouble of turning-in the sewing bands. The most likely explanation for the practice of turning-in is the effect that it has upon the thickness of the sewing support, and this is particularly intriguing. If one takes a strip of tawed skin 1.25 mm thick and passes an end through a slit to pre-form the thongs the thickness of the thong created (even with quite tightly pulled thongs of several turns) will be in the region of 3 mm thickness. It seems reasonable to suggest, therefore, that the original reason for pre-forming the thongs arose from the need to make up thicker thongs in the absence of sufficiently thick skins suitable for straightforward slit thongs. There are many inherent tensions within the pre-formed thong and if the slit extends into the joint area after sewing, a potentially weak area has been further exacerbated by the mechanical action of the board. The possibility arises that the heavier skins of the early medieval period were not available in reliable and consistent quantities, and that the habit of turning-in became more common as thinner skins predominated.\(^{105}\)

The pre-forming of the thongs would have provided the sewer with a comparatively easier thong around which to sew, and with a clear but narrow gap between the two spirals of the band against which to locate the passage of the lace pricking or pre-pierced or knifed sewing holes on the spine of the text-block. In a workshop binding many books of comparable size, it is possible that thongs were made in advance in some quantities, based upon a number of average sizes in common use. To what extent the total process of bookbinding was divided into separate operations is impossible to establish especially in this case.

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\(^{105}\) If this latter explanation is the case, it is necessary to consider whether binders were changing the thickness of skins they were ordering to suit need. The answer to this question has possible ramifications for the thickness of covering materials used in the fourteenth and fifteenth centuries, and may be one tiny indication of a radical shift in the way in which books were bound in the late medieval period.
In the survey of those books in which it was possible to observe the exact nature of the sewing support material, 38% of books had pre-formed thongs, 62% had straight slit thongs, and 1% (included in the 38% of the whole sample) had pre-formed thongs of tanned leather. One bookbinding of this type was by the Caxton Binder and was also covered in tanned sheep skin (Queens MS. James 18). Others of this type were typically in tanned calf skin covered bindings, such as that of the Lattice Binder c. 1490 (Corpus Christi College, Cambridge EP-O-11)\(^\text{106}\). The willingness to pre-form thongs in tawed skin and the comparative unwillingness to do so in tanned skin suggests a contemporary understanding of the effect. It seems that the habit of pre-forming thongs is associated with a desire to increase the diameter of the two halves of the band by introducing a twist or roll, perhaps at a time when heavier skins were becoming less common in the workshop, and that the technique became increasingly common throughout the fifteenth century. It is interesting to note that whilst the 62% of straight slit thongs are evenly distributed throughout the century, the 38% pre-formed are concentrated from 1450 onwards. Only 8% can be dated prior to 1450, whereas of the 30% which are post 1450, at least 19% are post 1470.

Observation of pre-forming is not easy, and should only be undertaken where the binding has become damaged to the extent that a reasonable area of sewing can be observed, and where it is clear that the bands are made of two spirals. In the case of bands which simply appear to be round in section the case is not proven, because the passage of sewing thread around a band will cause it to assume a round shape.

**Laminated supports**

On one occasion, sewing supports were observed in which the tanned leather had been laminated to create thicker material. Peterhouse MS. 146

\(^{106}\) The value of these figures relates to a comparatively small sample, and many more bindings would have to be examined before these conclusions
has a late fifteenth century binding by the G. W. Binder (Oldham's term (Oldham 1952)) on a manuscript Jacobus de Partibus super Auicennam (II). The sewing supports have been made from one 2 mm thickness of tanned calf and two 1 mm thicknesses of the same, pasted to the central element (i.e. the 2mm base) flesh-side innermost - the thong showing only the grain side has then been slit. This rare phenomenon is evident in the joint area where the layers can be seen in the process of de-lamination. The cover of this book is of mid-brown tanned calf of 1 mm thickness. This example seems to suggest that was an inadequate supply of thick leather readily to hand, for why else would the sewer have gone to so much trouble?

One wonders if this practice was in more widespread use than is suggested by this single example. As with so much speculative work, it is necessary to see many more examples of bindings from this workshop and from others of similar date before an assessment of the significance can be made.

Cords and other examples of sewing supports

In the survey of English fifteenth century work, no examples were found of books sewn on cord. However, there were plenty of examples of books with cord cores to endbands, but these always appeared with main sewing supports of tawed skin or leather. The use of cord for sewing supports was noted on Continental examples of the same period, notably on books from the Germanic world, and this suggests that the habit of sewing on cords did not spread to England with other émigré practices.

Kettle-bands

Before leaving the subject of the sewing supports it is necessary to describe a less common feature of English fifteenth century work. Kettle-bands were observed on one book and their presence was suspected on a small group (five in total or 1.75% of the total number of books surveyed). The could be turned into hard fact.
Corpus Christi, Cambridge copy of *Duns Scotus in IV sententiarum* was printed in Paris and the text is undated. The binding has been very badly treated in the past and there is considerable loss of surface about the cover itself; however, the tool of Oldham's Monster Binder is clearly decipherable in a number of places. The kettle-bands are of twisted, tawed skin approximately 3 mm wide, and are laced into the boards with no channelling leading to the anchor hole. They do not travel on the inner face of the board. The kettle-stitch rises between the sections with a straightforward winding action and there is no tying back or linking between the quires (and the structure is therefore not a supported kettle-stitch in the conventional sense of modern bookbinding - where the support is found within the passage of an ordinary linked kettle-stitch). The binder has brought his thread beyond the kettle-band as in normal support sewing, but in consequence his re-entry is on the wrong side of the band, in the sense that there is a risk of tear-back of the sewing through the backs of the sections, a factor which is not helped by the failure to link the kettle-stitch. It is obvious from fragmentary remains that (prior to the 1950s rebacking) the spine was lined with parchment either after the sewing or before (the kettle-band may have been sewn through a parchment liner) to help prevent tear-back damage.

**Numbers of sewing stations**

The number of sewing stations used in the fifteenth century varied considerably according to the size of the volume, the expense of the commission and the function of the book. As one would expect, large format books were often given more supports, but sometimes, I suspect, the weight of the sewing supports was also increased rather than the number of supports themselves. In the case of certain working books, it would appear that more supports were used to compensate for the heavy use the book was likely to receive. Hence, the small *Portiforium* from

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107 The work of the Monster Binder is explained in detail in Chapter 6, page
Norwich mentioned previously (Clare College MS. G'3.34, Photograph 21) is sewn on seven supports and the small Breviary of comparatively little textual significance (King's College MS. 30, Photograph 22) receives similar treatment, whereas a folio printed book by Oldham's Binder D, clearly turned out in haste (it has crudely hewn boards prepared with a draw-knife and was stained dark brown to black after covering with some colour affecting the wood on the inner face of the boards\textsuperscript{108}) is sewn on three stations.

According to the survey, the numbers of stations used seems to be unrelated to the date or place of binding. Sewings on four or five supports were equally common in Oxford, Cambridge and London. Sewings on eight or nine stations are often associated with books which were clearly made for religious use, although large numbers of stations were also observed in very large format books. Typical of the larger books is the set of Astronomical Tables (associated with Gonville and Caius College from its first binding circa 1465: Gonville and Caius MS. 668.761), which is sewn on 7 supports and is 615 mm high\textsuperscript{109}.

\textsuperscript{108} It is very unlikely that this is an instance of the later staining of an existing cover. When the book was completely dismantled recently to reverse some very unfortunate repair work, it was noted that certain areas of the cover had been dyed with the same dye prior to the initial covering affecting the underside of the board covering - as splashes - and where the cover had not been previously touched, and it seems that the additional dye was added to deal with turn-in areas which had been pared as part of the initial covering process.

Nicholas Pickwoad confirmed that he had seen this phenomena on books repaired in his workshop.

\textsuperscript{109} In all probability this manuscript was known to John Holbrooke (astronomer circa 1440) and/or to Lewis Caerleon (astronomer circa 1490), but it seems too late to have belonged to Walter Elveden. In any event, the early provenance suggests that it may have been made in Cambridge and was probably bound there. It is amongst the finest examples of tables of its type, and it is somewhat surprising therefore to find it bound in a sturdy but almost rustic quality binding.
The varying number of sewing stations used does not indicate the quality of the work. In the case of the Astronomical Tables from Gonville and Caius, for example, the binding is adequate but comparatively crude.

This survey indicates the following proportions in the sewing of English fifteenth century text-blocks. Of 305 books surveyed:

<table>
<thead>
<tr>
<th>Nos. of supports:</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>91</td>
<td>83</td>
<td>67</td>
<td>31</td>
<td>8</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Average Ht. of textblock per number of supports in mm.

Thus, it can be seen that the numbers of supports, whilst being profoundly affected by the size of the text-block, are also influenced by other factors. The fact that the amount of use a book was to receive, or the importance of a text, may have been influencing factors determining the amount of money spent on specific bindings, can be seen in the comparatively small average sizes of some books given large numbers of sewing supports. Conversely, the cheapness of some sewing structures can be seen in the comparatively large format of some books provided with small numbers of sewing stations. Hence, it is clear that the usage and importance of text-blocks are sometimes determining factors in sewing, rather than the simple dimensions of the book itself.

Sewing Route

The most common sewing route observed in fifteenth century book structures is also found in early medieval structures, and remained in use for sewing on double supports to the twentieth century. This route will

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110 The term sewing route refers to the passage of the thread around the sewing support(s) between the kettle stitches, where the kettle stitch is the term used for the linking stitch, found towards the head and tail of the spine, and which carries the thread from one quire to the next.
be termed direction led sewing or all-along sewing (see diagram in appendix for sewing routes, Diagram - Sewing A1-5) which describes instances where the needle has emerged in between the supports and is passed in front of the thong in the direction of the sewing. It is then passed behind both thongs, in front of the second thong and back between the thongs into the quire or section, before continuing on to the next station. In this type of sewing, the two thongs are drawn together to achieve tension in the sewing. All-along and herringbone sewing was observed in 38% of books surveyed. In 58% of the sample it was not possible to establish the sewing route with any certainty, because the sewing was completely covered, but it is reasonable to suggest that at least a further 40% was also likely to have been all-along or herringbone sewing, based upon the statistical sample in which evidence was clear.

All-along sewing can be linked from a quire to the previous quire to give herringbone sewing. This occurs when the needle is passed in the prevailing direction of the sewing in front of the first support, but as it passes behind both supports it is dropped beneath the sewing of the previous quire (Diagram B 1 and 2, 1 step) or beneath the previous two quires (Diagram B2, 2 step, A1 shows direction of thread around the cores, Trinity Hall MS. 4). In fifteenth century examples, the herringbone appears to be entirely of the one step variety, (i.e. no two-step herringbone sewings were found on English fifteenth century books). The practice of linking the sewing in this way was common throughout the century. Following, the introduction of sewings on printed books the balance was considerably altered, with the widespread use of straightforward direction led double support sewing without linking (i.e. all-along). The fluctuation in the percentages of sewings showing linking is quite interesting, but it would be wise to avoid assuming too much from the sample, save that the advent of the printed book does seem to have had a marked effect. (It should be

111 In the past it has also been called double flexible sewing and figure of eight sewing (which it is not). True figure of eight sewing could only be a
noted that in this survey the number of manuscripts surveyed fell in
direct correlation to the number of printed books catalogued for the last
quarter of the century). Perhaps the thinner quires of paper which
constitute the physical make up of the printed text-block account to some
extent for the tendency to move away from a linked sewing to a
straightforward all-along route.

<table>
<thead>
<tr>
<th>Year</th>
<th>1400</th>
<th>1420</th>
<th>1440</th>
<th>1460</th>
<th>1480</th>
<th>1490</th>
<th>1500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linked</td>
<td>67</td>
<td>91</td>
<td>84</td>
<td>0</td>
<td>31</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>Not Linked</td>
<td>33</td>
<td>9</td>
<td>16</td>
<td>100</td>
<td>69</td>
<td>84</td>
<td>100</td>
</tr>
</tbody>
</table>

One should not attach too much weight to the sudden and dramatic switch
in 1460, which may say more about the limitations of the statistical
analysis and the sample than it does about historical development. It
would appear that the surveying is out of balance at this point, with an
unusually high proportion of early printed books being assessed and very
few manuscripts receiving attention. In one respect this is significant,
because in an exaggerated way it highlights the difference in approach
between sewing the printed text-block and the manuscript text-block.
However, one must beware of such generalisations because many
manuscripts with thin quires were sewn in the same way as printed books.

The second sewing route observed in English fifteenth century books will
be termed here contra-direction led sewing or all-along contra-direction
led sewing. In this sewing, the needle emerges from the centre of the two
thongs and is passed backwards around the second thong against the
direction of the sewing. It then passes behind both thongs and in between
them, before passing back into the spinefold. (see diagram in appendix for
sewing routes*) When tensioned the sewing has the effect of pulling the
two thongs slightly apart (i.e. having the opposite effect to all-along

* 'packing' stitch. For a description of pack sewing, see page 115.
sewing). It is a sewing route which would normally be considered "wrong", because it is based upon a misunderstanding of the way in which the sewing route should work. In double supports it is desirable to sew them in such a way that they act as a unified component of the spine structure. In all-along contra-direction led sewing the tendency of the thongs to part leads to a tension at the sewing hole, as both thongs act independently, pulling away from one another. In time, the sewing weakens as the sewing holes become enlarged, and the support has a tendency to become insecure. All-along contra-direction led sewing does not afford the same firmness and solidity when the book is opened, because the tension between the two thongs ultimately results in a general loosening of the text-block. The use of spine liners and adhesive to consolidate the spine as a whole, are measures which may help to support an inadequate sewing of this type. All-along contra-direction led sewing was suspected in a larger number of sewings than in the actual number in which it was confirmed, because it is virtually impossible to be sure of the route unless the structure is broken. In circumstances where the bands appeared to be pulling apart, there was a suggestion of all-along contra-direction led sewing, but this alone was not considered determining proof. All-along contra-direction led sewing was definitely identified in 3% of the sample of books surveyed, and it is associated with bindings of the late fifteenth century (i.e. 1490 onwards) rather than the earlier decades. It was observed in bindings which also exhibited features consistent with a Germanic influence (i.e. books which also had a German style plaited endband with crown bead pattern or distinctly Germanic decorative features).

All-along contra-direction led sewing is sometimes seen in a small part of a text-block and not consistently throughout. It is very difficult to spot the mixtures of sewing routes, but in the case of the surveyed samples the analysis was sufficient for one to assert with some certainty that at least 75% of the text-block had been sewn in this way. If mixed sewings were to be included, where just a small number of quires were sewn in the contra-direction led style, a much higher number of books would have had to be
recorded, but the difficulty in making definite identifications of such sewings, and the fact that they do not seem to represent a consistent style, led to their exclusion from the analysis of the survey results.

Double hole sewing applies to sewing on single and double supports and occurs when the thread is passed from the inside of the fold, exiting beyond the support encompassing it, and re-entering the fold through a fresh hole below the support; the thread is then taken to the next support passing the first exit hole on the way (Diagram - Sewing A3). Double hole sewing was observed in a small group of books all dating post 1450. As a sewing style, it was found in under 1% of all the books surveyed but is likely to have been more common than this figure indicates.

Archewed sewing or pack sewing

Pack sewing occurs when additional windings of thread are made along the length of the support between the quires or sections. The sewing route, after the first passage of thread around the support has been established (but before it passed back into the quire), is continued by passing the needle either between the thongs, causing them to cross over one another, between each element of the support before re-entering the spine fold. Alternatively, two windings of thread were made around each support, allowing the thread to pack about the support (thus closely adhering to the original all-along technique). A variant method involves combining both routes to allow for more windings to occur (Diagram - Sewing B1).

When Peter Franck published his remarkable and perceptive article A Lost link, he concerned himself with pack sewing (which he termed "arched sewing") on single supports. He first observed the phenomenon on a printed book from Basel, dated 1558 and bound by Theodoricus Speibruch in 1641 (Franck 1941). Pack sewing has much earlier origins and was certainly a part of the English fifteenth century bookbinding technique. It
was also part of the general European technique at that date\textsuperscript{112}. It is obviously much easier to wind additional loops of thread around single supports, (when the desired amount of packing has been reached the sewer simply re-enters the spine fold), but with double supports the problem is more complicated and can be resolved in a number of ways. (It will be necessary to study many bindings before any firm conclusions can be drawn about what packing routes were in common use). Packing can be seen relatively easily if the sewing of the book is exposed. By counting the number of threads on the spine and by comparing this with the number of sections or quires it is possible to see how many loops of thread on the supports there are for each quire.

Full packing was observed in a comparatively small number of books. This may have been due to the fact that a large proportion of books were sewn in the herringbone style (to be explained later) where it is still possible to pack sew but where the packing does not really work properly on account of the linking threads passing over the pack threads. No examples of packing were observed when herringbone sewing was present\textsuperscript{113}.

A larger group of double support sewn books exhibited pack sewing, but without dismantling the bindings it would be impossible to establish with certainty the route taken by the sewing thread in achieving the packing. Of 110 books in which the sewing route was clear the following proportions were observed:

- 75% had no packing
- 21% were packed

\textsuperscript{112} There is good evidence that the Italian tradition of pack sewing is particularly fine, and may have been the cradle of this technique. Additional research is required to assess the importance of 'packing', and to evaluate the Italian contribution in particular.

\textsuperscript{113} It does seem that mixing herringbone with packing has no basis in historic examples, and has been created in modern work as a form of hybrid.
Pack sewing was observed on books from 1450 onwards and increasingly use towards the end of the century. It was rather more common on printed book text-blocks, although this probably has more to do with the nature of the sample than with any objective evidence. No books were found on single supports with pack sewing, but that does not imply that such artefacts do not exist. The great age of pack sewing probably occurred in the fourteenth century, although additional work is required to support this theory. In the fifteenth century it is not in very widespread use and appears to be in decline. Its re-emergence in association with printed book bookbindings may constitute a revival, and if this is the case one must ask the question as to why such a revival took place. Speculation is difficult and much further work is required, but one wonders if the émigré influence could be at work, or if the paper textblock was perceived as being in greater need of an arched opening characteristic.

Half-packing is an intriguing phenomena first noticed during conservation work on a small group of late fifteenth century books - both manuscripts and printed books. In a few cases it was possible to observe the actual route of the sewing where the supports had broken down, revealing a view of the structure in cross section. It occurs as a modification of the conventional all-along sewing, when the thread passes in the direction of the sewing in front of the first thong, up and in between the thongs, passing in front of the second thong, then behind both thongs to pass a second time in front of the first before re-entering the fold. This creates two turns on one thong as against one on the other. When the thread passes along the following spinefold, the reverse is achieved thereby balancing the effect. (It would also be appropriate to term this self-compensating half-packing). It is difficult to observe half-packing without dismantling the sewing structure, but if one can count the threads on the backs of the thongs, a regular pattern can be observed: one extra thread can be seen on one side of a double band for alternating turns of thread as a recurring pattern across the width of the spine, (Diagram - Sewing A5).
Examples of this type of sewing were seen at Queens' in MS. 18, Peterhouse MS. 146, Jesus Q A 17 and in some bindings on printed books by Oldham's Huntsman Binder at Corpus.

Half-packing appears to offer the sewer an easy way of packing the sewing structure so that it prevents poor opening characteristics, or to use Peter Franck's words (expressing the excitement of his discovery) the binder "filled in the open spaces on the cord between the usual single threads of two signatures with the achievement that when the sewed book is opened, the cord cannot bend at a sharp angle. It is resisted by the filled in thread and thus forced to bend in a curve" (Franck 1941 p. 10). Half packing prevents the over-packing of a structure on medium weight thread composed of average rather than thick quires, and it gives the sewer greater control over the potential swelling of the spine as a whole. It is a controlled sewing which is comparatively quick to execute, and can be alternated with full packing should that be necessary.

The direction of the sewing of the text-block

In order to make general comments about the history of book structures it is necessary to introduce elements of hypothesis and guesswork for two reasons. First, the surviving sample of books available is very limited in comparison with the numbers which must once have existed. Secondly, establishing the direction in which a book is sewn is only possible when the spine of the book is exposed or partially exposed and can be very difficult, especially in the absence of link sewing or when the spine has been lined with adhesive. The direction of the sewing can be deduced from the prevailing pattern established by the kettle-stitch. One useful clue can be the presence of a thread either entering or leaving a sewing hole at the kettle-stitch. Threads entering a hole from behind the previous section's sewing hole will be travelling either from or to that hole, and must therefore exit from a quire which has been added to the previous one, and this will help establish a sewing direction in the absence of link sewing. In the case of books sewn in the herringbone fashion (explained above), the sewing direction will always follow the arrow shape, with the pointed end having been added last for the same reasons as explained for kettle-stitch analysis.
the general level of research into early book structures as a whole is still in its infancy. Sometimes, clues point towards a method or technique and from this a new method of analysis can develop. In studying text-block sewing directions it is sometimes obvious, on other occasions a judgement has to be made on the basis of several clues. It is interesting however, to note that in the case of sewing direction a change appears during the late medieval period, associated in particular with the age of the printed book. Throughout the manuscript period books were normally sewn from the front to the back. All Romanesque bindings observed seem to have been sewn in this way, and even in the fifteenth century this more or less holds true. However, when the printed book appears different values seem to develop. Although, the survey provides evidence of some significant changes during the entire fifteenth century. Overall the sample of books (numbering 103 in total where accurate information regarding sewing direction could be gained) suggested that 68% of books were sewn front to back but a surprising 32% were sewn back to front. Only 6% of the total were sewn in this way prior to 1470.

Of the manuscripts from the early part of the century sewn from the back to the front, the best example was King's College MS. 30, the early fifteenth century Breviary (Photograph 22). The sewing of this book is remarkable in several respects. It is a particularly difficult and a very neat piece of sewing. The number of supports in relation to the height of the text-block has been noted previously, but the very neat herringbone pattern also indicates that the direction of the sewing is contrariwise to the norm.\(^\text{115}\)

The largest group of books sewn from back to front post-dates 1470. Twenty of them are printed books whereas only six of them are manuscripts.

\[^{115}\text{The small group of six manuscripts identified with linked sewing sewn in a back to front direction pre-dating 1470 can be listed as follows: Nottingham University Library - Mi.L.2.b & Mi.L.M8 & Mi.L.M9, Clare College N 1 9, Gonville and Caius MS. 475.672, King's College MS. 30. The Nottingham group may represent a cluster associated with one binder, all}\]
Although the sample is small, the overall trend is interesting. There seems to be a considerable increase in the practice of sewing books in this way after the introduction of printing. It is very difficult to explain this phenomenon, and it may be simplest to say that not all books were sewn front to back, and that it is unwise to take the majority as the norm. It does seem however that the trend in early printed books may have something to do with the nature of the text-block itself. One explanation concerns the way in which the book was collated. In the case of manuscripts, the monastic scribe of the early medieval period would have been familiar with the text that he was collating, and after completion of the text he would naturally have collated from front to back and therefore presented the text-block for sewing in that way. For in the early period the making of the book was a unified process, most likely tackled by the same monk. Only in the secular age, at the beginning of the thirteenth century, does one suspect that the processes involved in the making of the manuscript are divided between different craftsmen. (It seems extremely unlikely in explaining the order of the text-block in the sewing of manuscripts that it had anything to do with an overlap between scribal work and sewing, because the sewing would have taken hours whilst the writing may have taken months). This habit of sewing from front to back probably became a traditional approach which continued as a natural progression in binding practice. Even today, a binder will keep an eye on the leaf and quire signatures as the work progresses. What better way to check that the text-block is collated in the correct order - following the catchwords (when present) as the sewing progresses.

There is no obvious reason why the printed book should be any different. The same criteria must have applied to the printed book, and the hand-signed printed leaves demonstrate clearly the continuation of approach as do the slightly later printed signatures. However, there is a profound difference between the manuscript and printed text-block. It is well

of the volumes came from the Middleton Collection previously kept at Wollaton House.)
understood that the printed entity was gathered first, with the last signature on the bottom of the stack and with the title (this was one innovation of the printing phenomenon) on the top. Sewing multiple copies did not involve the same peripheral concerns as sewing a unique entity, as for the manuscript. In the print shop, at the outset, a complete unit was probably taken to the binder, perhaps wrapped in printer's waste, and placed on the bench of the sewer. Beginning at the beginning, he took off the top signature with the colophon, sewed it on first and proceeded through the entire text-block.\textsuperscript{116}

Sewing structures with no kettle-stitch

A small group of books were discovered in which the sewing was continuous between the endband and the main sewing. It has been recognised for some time that such sewing structures existed, but quite often they have turned out to be mis-interpretations arising from poor powers of observation. The examples found in the survey were, without question, sewn in the fifteenth century and, most interestingly, were seen on books of quite different types. Bindings sewn in this way seem to have been quite rare; only 1% of the sample in the survey, were found to be sewn in this way.

Gonville and Caius MS. 166.84 (Various \textit{tracts} in several hands, C.M.A. 1172) has a very interesting binding which re-uses original thirteenth century boards. The sewing of the book appears to be continuous and has clearly been re-sewn to incorporate the sections of fifteenth century material on paper. However, the binder has probably re-used the original thirteenth century tawed bands (and may well have sewn the book off the

\textsuperscript{116} I am indebted to Dr. John Lawrence Sharpe, Academic Librarian for Research Affairs, Duke University Libraries, Durham, North Carolina, for discussing this problem with me and, as part of a lengthy correspondence, for providing some possible explanations; the stated examples are those which we decided were the most plausible, but any errors in this hypothesis should be ascribed solely to my interpretation of the correspondence.
frame) which fit into the very long and wide lacing paths. Lacing is over the edge of the board face through a drilled hole on to the inner face. It then travels in a surface channel to be anchored with a hard wood dowel at the end of the channel (i.e. it is from a quite late thirteenth century binding and is not fine work). The sewing of the 303 X 215 mm text-block is on three supports, and the thread runs out to the endbands, which are covered and cannot be interpreted.

Gonville and Caius MS. 374.594 is a late fifteenth century manuscript in two hands (Compendium S. Scripturae ..., T. James 11, C. M. A. 834) and has a most unusual sewing. The semi-limp binding has been substantially altered since M. R. James catalogued the manuscript in the 1890s (James 1899)\textsuperscript{117}. The sewing is original and undisturbed. It is done on three supports of straight, slit-tawed skin. The sewing route around the double supports travels contrariwise to the direction of the sewing, as described for contra-direction led sewing above, and passes straight to the endbands from the first and final supports. The core of the endband is single and possibly of tanned material. The endbands are covered. The primary sewing appears to be composed of a straightforward winding of thread, without a reversing-stitch, which simply passed underneath the core as it approached from the previous station. It was then wound along to the next quire before dropping down to the support (interpreted from the now damaged and distorted endband at the head of the binding).

Pembroke College MS. 221, a very neatly written manuscript, from a Carthusian house, is a book of devotional tracts.\textsuperscript{8} It was written circa 1491 and the binding was made shortly thereafter. It is a fine manuscript, with initials in gold, characteristic English ornament in blue, red and green, and very fine pen-work initials. The calf parchment is of good quality. On the

\textsuperscript{117} The covers, i.e. boards, are composed of fourteenth century Canon Law manuscript, but the nature of the original structure is now virtually impossible to decipher.
last leaf of the manuscript is a rare example of a written account of the rubricator summarising what work has been done - presumably as preparation for the drawing up of his expenses. It is very sad that the very unusual blind tooled binding was completely replaced in the early 20th century - with the exception of the sewing and the fragmentary remains of the cover. The surviving details of the binding are vital because the fact that the cover fragments fit the text-block, and the fact that the edges of the leaves are undisturbed, suggest that the extant text-block has not been trimmed. That this was once a very handsome binding cannot be doubted, given the quality of the text-block, the notes of the rubricator and the fragmentary remains of the tanned cover with its elaborately designed tooling incorporating a cipher of some description (see drawing). The cover may be of tanned sheep or goat, but this is not obvious from its present condition.

The sewing is upon five slit-tawed thongs. Prior to sewing, the quires have been lightly knifed to direct the sewer to the stations and, interestingly, the locations for the kettle-stitches have also been knifed. In the case of the endsheets, the thread passes through the kettle-stitch holes and presumably travels up the back of the spine as well as into the spine-fold of the quire (possibly as a means of anchoring the endband cores). However, the rest of the text-block does not incorporate a kettle-stitch and the knifing holes were never used. Sadly, the binder, J. B. Hawes, who repaired the book at the turn of the century, has removed all traces of the endbands themselves and we are only left with the ends of threads running out to the extreme head and tail.

113 It contains Carthusian translations of various texts (James 1905pp.197-199).
Endbands

During the fifteenth century endbands were frequently of the compound type\textsuperscript{119}. In other words, the endbands were usually worked twice. The first sewing provided the structural foundation of the endband and was normally sewn in flax or hemp thread. The second sewing was essentially decorative and was commonly sewn in coloured silk over the foundation sewing. The secondary sewing in colour was not always purely decorative, and did frequently serve as a constructional detail in incorporating covering materials.

Sewing

First it is essential to define headbands and endbands\textsuperscript{120}. A headband is a thread-worked band at the head and tail of a text-block which may or may not have a secondary sewing in a decorative silk. The core of the headband is cut off at either end and is therefore not laced into the boards and to some extent it is a decorative feature. Some headbands are worked over a strip of parchment prior to attachment to the book, and are subsequently adhered to the spine of the book i.e. they are not worked. The earliest examples of this which I have observed date from the sixteenth century\textsuperscript{121}. An endband is essentially the same as a worked headband except the core of the endband continues across the joint area and is laced into the board. When Christopher Clarkson originally introduced the term endband, he was drawing a distinction between the important constructional feature of

\textsuperscript{119} Terminology of Christopher Clarkson, unpublished.

\textsuperscript{120} What follows is a summary of the definition developed by Christopher Clarkson whilst working in Florence in 1967-8.

\textsuperscript{121} Nicholas Pickwoad has recorded fifteenth century examples of this sort on continental books. There is a very peculiar example of a thirteenth century tab worked off the book, on a binding, in the Parker Library - Corpus Christi College, Cambridge MS. 89, which was mentioned to me by Pickwoad. MS. 89 has other peculiar features, including joined oak boards, and is in a dilapidated condition suggesting much later repair work has taken place.
a laced-in band and the later couped decorative headband. Unfortunately, successive users of the term have applied it in a generic sense to describe both the head and tail bands, and this has nothing to do with the original definition. During the fifteenth century, in England, endbands are seen in universal use until the 1480s but in the 1490s the headband makes its first appearance.

The use of different materials for the formation of the endband core reveals the extent to which variations in technique brought with them the use of different materials in every detail of book construction. The core material was identifiable in over 50% of the books surveyed. As observed previously in the context of materials in general, analysis of the cores provides insight into the widespread use of tanned leather in binderies which were still using tawed skin (39% of those books with tanned endband cores were sewn on tawed skin supports).

Cores:
- 52% Tawed skin cores
- 10% Tanned leather
- 37% Cord
- 1% Parchment

Cores used for endband sewing were usually twisted. It was possible to establish the type of endband core used in 153 examples, and twisted cores pre-dominated throughout the century. The other techniques employed are outlined in percentage terms, and tended to be identified in later fifteenth century bindings.

- 84% twisted
- 12% straight
- 4% rolled

(Diagrams - Endband Cores 1,2 and 3)

Tying-down the endband

In the early medieval period, tying down in every quire was almost universal where the quires of manuscripts were of substantial thickness.
However, by the fifteenth century, the multi-quired text-block was often made up of leaves which were thinner and the overall quire was not always as thick. Text-blocks were often composed of many quires. In these circumstances it is not unusual to find the binder alternating the sewing of the tie-downs, and this tells us something of the way in which they were sewn. It is possible in these cases that the endbands were sewn with the book in a small wooden screw press, with the use of "flashes" to flag or "flash" the quire centres (Christopher Clarkson's everyday term for the strips of material placed in the centre of the quires prior to the sewing of the endband). These strips, nowadays of paper, tell the binder where to place the needle when sewing by guiding him to the centre of the quire. Having sewn one endband, missing a quire with each tying down, the text-block was presumably removed from the finishing press and turned through 180°, thus bringing the other end of the book to the front. The second endband was then worked in the same direction as previously (usually from left to right), repeating the technique, and thereby providing one tie-down per quire alternately at the head and the tail. This alternate sewing should not be regarded as an abbreviated form of the endband. Rather it seems to be a means of preventing the tie-downs from causing a swelling at the ends of the book which was out of proportion with the swelling of the text-block as a whole. In a situation where one might find as many as forty or more quires, it would not have weakened the sewing of the endband to be tied-down alternately in this way.

Endbands were frequently sewn with a lighter weight thread than that used in the main sewing, and it is not rare in the fifteenth century to find that the binder has chosen a lighter thread of a quite different kind. In a

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122 It is clear that small wooden screw presses were in common use because they were required for the draw-knife trimming of book edges, and there are many examples of edges cut in this way on fifteenth century bindings. In the depiction of the bookbinder's workshop dated 1568 in Jost Amman's Book of Trades, small lay presses are striking features of the illustration.
few cases the survey revealed endbands sewn with a Z twist thread alongside a main sewing with an S twist.

Towards the end of the fifteenth century, with the large print runs of the 1490s, and perhaps also in the 1480s, endbands begin to appear that are truly abbreviated. This is a clear indication of the pressure which printing had created within the first few decades of its appearance in England. It is also possible that binders had discovered that fewer tie-downs were acceptable. The decline in standards was partly the result of a reaction to a changed situation, because more work could be achieved with less effort and in less time. Endbands of this sort have far fewer tie-downs than would have been considered acceptable even twenty years previously. These structures should not be confused with those which have alternating sewing. In these cases, one finds tie-downs randomly missed as a short cut. In the meanest examples, it is possible to find endbands on books with twenty or more quires served by only six tie-downs.

An analysis of the surveyed books shows the following proportions for books with tie-downs between every section, abbreviated and alternating. It should be emphasised that these figures are derived from data spanning the entire century. The fact that the concentration of abbreviated structures tends to be placed towards the end of the century and is associated with printed books should not be overlooked; equally it is important to remember that the alternating tie-downs occur throughout the century.

<table>
<thead>
<tr>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tied-down every section</td>
<td>72%</td>
</tr>
<tr>
<td>Tied-down in alternating sections</td>
<td>10%</td>
</tr>
<tr>
<td>Not tied down every section (abbreviated)</td>
<td>18%</td>
</tr>
</tbody>
</table>

**Endband types**

Fifteenth century English endbands can be divided into two main groups which relate broadly to an early period and to a late period. The large group in fact spans the century; these are known as medieval back tie-
down endbands\textsuperscript{123}. In the later part of the century, a number of abbreviated forms of endband start to appear.

Medieval Back Tie-down Endbands, Beadless Endbands and Abbreviated Endbands

The medieval back tie-down endband can be identified by the presence of a reversing-stitch on the spine of the book. This is not always easy to see. If the endband incorporates a number of windings between the tie-downs, to accommodate the thickness of the quires, the reversing-stitch may be interrupted and less apparent. The endband may almost appear to be beadless on account of the gaps created by the additional windings. Conversely, this may not be the case if the endband has been sewn in a different way by employing two ends of the same thread working in unison: one to create the windings and the other to create the reversing-stitch and tie-down alternately. However, by observing the spine face of the tie-down it should be possible to see a loop of thread passing around the tie-down thread on its way to the winding and to the next tie-down.

The endband is sewn by attaching the thread on to a core which is then tied down (usually into the endsheets of early fifteenth century books) from the inside of the spine-fold to the outside of the spine. The thread is then brought up the back of the spine and twisted upon itself before being passed again over the core. At this point the needle and thread are pointing away from the text-block as the thread passes over the back of itself to bring it on the side of the direction of endband formation. The thread is then either wound around the core to fill in between quires, or is taken back down into the centre of the next quire and so on (Diagram - Endbands 1).

The other main endband structure of the fifteenth century is achieved with a figure of eight sewing route. This is a non back tie-down, in which

\textsuperscript{123} A term defined by Christopher Clarkson; he first noticed the feature whilst working in Florence during the recovery of flood damaged books in 1967.
the band is sewn without a reversing stitch. The disadvantage of this structure is that when tensioned the band is not pulled on to the edge of the text-block in the same way that the back tie-down is anchored. These endbands appear to have been formed with a very simple technique of winding and tying down, without reference to the problem of anchoring the tie-down securely into the back of the fold, and they were easier to form. One or two examples appeared to wind along the width of the spine, passing down the back of the spine, under the kettle-stitch, up the inside of the fold and then passing on the other side of the core before immediately winding on to the next tie-down. Having reached the next tie-down the process seemed to be repeated in reverse.

Endbands are amongst the most vulnerable parts of a book structure and in consequence, are one of the most commonly lost or damaged features of what is frequently an otherwise undamaged original binding. In some cases, books have been rebacked and original endbands have been partially hidden by modern covering practices. The obscuring and the complete destruction of evidence makes it difficult to analyse details of this type, but there can be no doubt that the survey of books provided conclusive evidence of the widespread use of the medieval back-tie down endband throughout the fifteenth century, and there can be little doubt that it was the commonest form of endband sewing. Analysis of the figures for endbands indicates the following:

**Primary endband sewings -**

- Medieval back tie-down: 73%
- Endbands with no reversing stitch: 11%
- Endbands covered (e.g. with the primary cover sewn over them): 12%
- Front tie-down (query later addition): 1%
- Abbreviated endband structures: 3%
- Unknown: 12%
It is possible, indeed likely, that inside the covered endbands are more examples of the medieval back tie-down endband. Alternatively, there may be plain endbands without a reversing stitch i.e. non back tie-down.

In addition to the main groups of endbands described, a number of abbreviated structures associated with the late fifteenth century (i.e. the 1490s when the larger print runs of printed books had started to appear on a regular basis) were discovered.

A typical example of modifying endband techniques to abbreviate the work involved can be observed on the work of the 'G. W' binder, who, it is now thought, practised in Cambridge (Foot 1992 pp.15,16). This binder sometimes used cord as the core for his endbands, and exposed examples of his shorthand structure can be seen in one book in the Peterhouse manuscript collection deposited at Cambridge University Library. Peterhouse MS. 146 is a late fifteenth century manuscript on paper, being a copy of Jacobus de Partibus super Auicennam (II). The endbands have been laced into the board but they are not properly worked structures, because the binder has probably captured the core in thread and taken it around the kettle-stitch in five independent locations across the width of the spine, and by means of these independent tie-downs he has attached the cord cores respectively to the head and tail of the book. The tie-downs are most likely not true tie-downs, in the sense of being part of one continuous structure, and they do not consistently pass through the centre fold of the sections. Whilst it is hard to assess the structure on account of its fragility, it is probably safer to refer to these so-called tie-downs as secondary thread tackets. It is possible that there is some sparse winding between the tie-downs, but the endband covering prevents examination of this detail. If it is a continuous thread, the tie-downs are certainly not conventional. The thread must come off the core, pass down the back of the book on the spine side, enter through the fold above the kettle-stitch, and then be passed on the inside of the fold, passing back on the other side of the kettle-stitch to the outside of the fold and then back up to the core on the outside of the spine and wind loosely on to the next tie-down (Diagram - Endbands 4C).
This peculiar way of tying down, has the effect of pulling the core off the back of the book, rather than pulling on to the book as with a medieval back tie-down endband. An alternative version of this type of tying down was also observed on a printed book of the sixteenth century by an English binder at Queens' College (A. 10) in which the thread forms a "figure of eight", between the kettle-stitch and the edge of the book but below the endband itself (this must not be confused with a conventional figure of eight endband sewing), by passing through the exit hole north of the kettle-stitch from the inside of the fold, travels down the outside of the spine, enters below the kettle-stitch and re-exits through the hole north of the kettle-stitch. It then travels to the top of the spine and winds from the inside of the core around to the next station at which tying down occurs. Clearly there were many variations of this sort from the end of the fifteenth century onwards. In another example of the same binder's work at Corpus Christi Cambridge (Rainerus de Pisis, Pantheologia, Venice, September 1486) the core for the endband is of tanned leather which was laced in, but the endbands themselves have now been lost and the exact nature of the structure is almost impossible to tell. The binding of Selwyn College INC. 4, a 1493 copy of Durandus: Rationale, is another example of a G. W. binding with covered endbands. In this binding, the covering leather has largely been rubbed away, exposing the cord core. There is no proof that this endband was any more than a piece of cord which was laced into the boards at either end but it was not sewn into the text-block at all i.e. it was merely used as a core about which to sew the ends of the spine leather, thereby giving the impression of ordinary covered endbands. (Covered endbands are discussed in greater detail in the context of secondary endband sewings). The spine of the Selwyn book relied on paste to hold the cover and endband to the book structure.

124 The Henry Davis Collection at the British Library has a binding by this binder (P1417: Vocabularius utriusque iuris, Basle / Kessler 1488) which may have had a similar endband construction although in this case it was not laced in and therefore must be classed as a headband (it is now mutilated almost beyond recognition).
Two significant indicators of the quality of craftsmanship in the sewing of endbands are the care with which the centre of the quire or section is located for the sewing of the tie-downs, and the care with which the needle making the tie-down is or is not taken beneath the kettle-stitches. The first factor is important because the endband is a structural part of the binding which anchors the leaves at head and tail, affording support and security to the bifolia when the book is opened, and thereby helping to control the opening characteristics at the most extreme points. Failure to sew through the centre fold of the quire results in some leaves not being anchored in this way, and often involves casual and untidy sewing with damage to the leaves in the spine-fold area. The sewing of the endband tie-down beneath the kettle-stitch ensures that the endband sewing, though independent, is incorporated within the main sewing thereby ensuring that there is less likelihood of tear-back from the tie-down. It also ensures that there is a more secure and stronger structure. In the survey of fifteenth century books, the observed failure to select the centre of the quires was so tiny as to be insignificant, and almost every binding examined was accurately sewn through the centre (the failure rate was under 4% for all of the books examined with clear evidence available i.e. 242 bindings). This suggests that some established technique of indicating the centres of quires, as in modern practice, was in use by this date. In the case of sewing beneath the kettle-stitch, the picture is somewhat different and significant. The survey revealed that 83% of books were tied down beneath the kettle-stitch, 13% were not tied down under the kettle, and a further 4% were mixed, with the head or tail being beneath but the opposite end being above the kettle-stitch. It is interesting to note that all pre-1450 bindings were tied down beneath the kettle-stitch, and the closer to 1500 the greater the number with tie-downs above the kettle-stitch. (The sewing of the endband tie-downs above or below the kettle-stitch is a significant factor in previous centuries also). The majority of books with tie-downs that do not pass beneath the kettle-stitch is to be found amongst the bindings for printed books.
Secondary Endband Sewings

Typically, in the fifteenth century we might expect to find compound sewn endbands, i.e. a primary endband sewn in linen or hemp thread, as previously mentioned (Photograph 23), to which is added two or three crowning cores by means of a secondary sewing in decorative coloured silks (Photograph 19). The century also provides many examples of manuscripts and printed books with Germanic style plaited tawed and sometimes tanned thong endbands (Photograph 24 and Diagram - Germanic World Plaited-Endbands, England fifteenth century 2 and 3). A number of other decorative features were found on a smaller group of books, notably the use of chevron sewing, usually in blue and white linen thread, over a primary endband.

Compound endband with secondary sewing in silk incorporating crowning cores

In the survey of books for this research 73% of the sample of surviving endbands were of this type.

The decorative secondary sewing of a compound endband involved sewing a silk thread, usually in two or more rarely, in three colours, around secondary thread cores (often three - triple crowning cores or, less commonly, two - double crowning cores) which were often situated to lie flush with the edge of the book in circumstances where the spine corner had been slightly back-cornered to accommodate the full endband (Diagram - Typical fifteenth century chemise book binding, shows this detail for BM. Add.22,285)125. The secondary sewing is functional in addition to being decorative, because it encloses the covering material at the head and tail of the spine after it has been trimmed (Photograph 25, triple crowning core endband). The covering material can often be observed where the silk has become rubbed or degraded, and it usually extends around the core, being cut away where the crowning core nearest

125 Christopher Clarkson's terminology.
the fore-edge is located. It is not uncommon to observe missing endbands in circumstances where there is a series of needle holes on the spine, indicating that at one stage the secondary sewing of an endband once passed through the covering material at this point.

The silk used in the secondary sewing was quite brilliant in colour when first sewn, and the badly rubbed and degraded/faded silk that remains on surviving examples gives a less than adequate impression of what the endbands must have looked like when first sewn. The endbands are associated with bindings covered in alum tawed skin which were otherwise undecorated; the bright colours would have been very attractive features of otherwise plain bindings. The fashion indicated by the survey of books undertaken for this research indicates that they were in use throughout the fifteenth century, but towards in the last quarter of the century other methods of dealing with the spine covering were employed ever more frequently.

It is possible, by analysing the use of coloured silks in the formation of the secondary sewing, to gain some idea of the fifteenth century fashion in the making of these features. From the end of the twelfth century, many colours were used to make very bright endbands, and this feature of the late medieval binding must have been extremely striking. The colours were used in numerous combinations of windings e.g. 4 of blue, 3 of green, 4 of red and 3 of blue, 4 green and so on - the numbers of windings were not necessarily evenly distributed across the spine width. Common combinations were:

(i) blue, green and red (ii) blue, pink and yellow (iii) blue and yellow (iv) blue, yellow and green (v) yellow and crimson (vi) blue, white and green (vii) red and green (viii) green and blue (ix) green and yellow. The use of the individual colours can be analysed in percentage terms, based upon the number of times the colours occur in the endbands analysed for this research:

pink (possibly faded red) 7%
The silk was always observed to have an S twist and was usually of loose to medium torsion.

**Compound endbands with secondary plaited thong work**

The second most common endband observed on fifteenth century English work is commonly known as the Germanic style plaited endband (a term which seems to be in current use, but the origin of which is uncertain and which is doubtless founded upon the observation that this type of structure was especially popular in the Germanic world during the fourteenth and fifteenth centuries). The plaited secondary endband was found on 17% of the sample of books researched and seems to be more concentrated in the latter half of the century, but it is by no means uncommon in the first half. Only 1% of the sample provided evidence of the use of tanned thongs as opposed to tawed skin for the plaiting, but this most probably reflects the impermanence of the tanned material compared to the very durable quality of tawed skin. It is well known that tawed skin was frequently stained, and that the Lily binder of the late fifteenth century often used pink tawed endbands on tanned calf bindings, and so it is a little surprising (and a salutary reminder of the limitations of survey material) to note that only 1% of the endbands surveyed showed clear evidence of the use of red/pink stained tawed skin for plaiting.

The plaiting is worked on a compound endband (i.e. the medieval back tie-down aforementioned). As with all compound endbands involving secondary sewing - completion is usually worked after the book has been covered - thus, plaited endbands generally incorporate the head and tail covering edges by including them. The thong is passed through the cover and underneath the compound endband. Examples of endbands plaited...
prior to covering do exist, but no examples of this sort were found in the course of this research\textsuperscript{126}. Bernard Middleton suggests that the thongs were worked wet, in order to achieve close formation and a set appearance, but this seems unlikely, especially in the context of tawed skin thongs (Middleton 1978 p.104). The thongs observed in analysing these structures varied little in width from one example to another, ranging on average from 3mm to 4mm.

There are variations in the way a plait can be formed, but the commonest observed in the fifteenth century English books surveyed was that known as the plaited endband with a crown bead pattern\textsuperscript{127}, (Gast 1983 pp.42-58). The plaiting is generally thought to be achieved with two needles, working from one end of the thong to the other, with a primary endband serving as an anchor. The thong passes backwards and forwards encompassing the compound endband with each pass of a needle, whilst the plait is formed by linking the two ends by the formation of loops in one end through which the other is passed. (Diagrams - Endbands and Photograph 17 d-f). The creation of plaited secondary endbands must have been a comparatively quick procedure once the technique had been completely learned, because the width of the thongs would have enabled the sewer to cover a wide area of compound endband far more easily than would have been possible with the sewing of the more elaborate winding in fine silk thread and which frequently incorporated crowning cores.

A simple one-needle plait can be learned in a few minutes and these are commonly found on English fifteenth century bindings. One good example is to be seen at Whitby Museum on the \textit{Abbot's Book} (or Whitby

\textsuperscript{126} In these cases the covering material is brought behind the plaited endband and turned down behind it in much the same way that a modern head cap is formed. This type of pre-covering plaited endband was first mentioned to me by Nicholas Pickwoad in the context of contemporary Continental bookbindings.

\textsuperscript{127} Terminology of Karl Jackel.
Register which dates from 1160 to 1539\textsuperscript{128}. This remarkable manuscript retains its twelfth century boards, but has been rebound in the fifteenth century, at which point the boards were turned fore-edge to spine when the book was resewn and then the boards were re-laced in the late medieval fashion. The twisted tawed endband is worked and laced in, and a tawed plaited secondary sewing has been added to incorporate the cover head and tail.

Chevron Plaited Endbands\textsuperscript{129}

This type of endband was discovered on 5\% of the fifteenth century books surveyed, and in view of the well known use of this technique in the fifteenth and sixteenth centuries (and earlier) it is a little surprising that it was only seen on a comparatively small number of books. The ribbon of loose thread was brought in one movement over a securely sewn compound endband (usually of the medieval back tie-down variety), possibly tied down in every section (see note on endband tie-downs above) to give adequate strength for the secondary working. The plaiting was undertaken with two needles, and was typically worked in white and blue linen thread. (Few of the chevron plaited endbands were sewn in silk). The needle was often threaded three or four times and the plaiting proceeded in a figure of eight formation over the compound endband (Photograph 27).

\textsuperscript{128} Much of what is known about Whitby Abbey, and about the earlier Norman Abbey, comes from this book. It is also a source of very important information regarding the history of the Abbey Library in or about 1180 A.D., because f.138 lists in three columns all of the books present at that date, i.e. the time of Abbot Richard II (Whitby Literary and Philosophical Society 1957).

\textsuperscript{129} Terms derived from heraldry, and used in the description of bookbindings, were largely adopted for this purpose by Christopher Clarkson, and have been taught by him in the absence of an established terminology. In the case of this particular term, chevron, the heraldic image is used to encompass a family of secondary workings.
A good example of this type of sewing can be seen in Peterhouse MS 276, which was plaited after covering and which therefore traps the primary covering material. The chevron is sewn in blue and white, the needles appear to have been threaded with four threads (all beads observed seemed to have been composed of four or three coloured threads). The distribution of the threads across the endband is not even in number, giving rise to a chevron which appears wider in one area compared to another. Straightforward blue and white windings are employed at the commencement and end of the plait to anchor the structure. It is interesting to note that the head was plaited from left to right, whereas the tail was plaited right to left.

In the case of the chevron plaited on the immensely impressive blind-tooled Oxford binding on an imprint of Theodoric Rood (John Lathbury, *Liber moralium super threnos Jeremiae*, Oxford c.1482: Cambridge University Library Ic. 3.J.2.2 (3582), Gibson 23, Oates 4164) the compound endband has been sewn on a cord core of five strands of the main sewing thread (3zS) and is tied down, possibly, in only 5 places across the width of the spine. The needles were threaded with four threads, and the plait is straightforward across the spine width, being composed of four blue, four white and so on. The thread of the plait is a light coloured linen thread in white or dyed blue, and it is of a fine weight being a fairly common 2zS. The chevron is sewn over the covering material at the head and the tail. In this instance the decorative quality of the endband must have been a significant factor in the choice of technique by the binder. At the same time it can be seen that this was a method applicable to the binding of printed books and offered an efficient and reasonably quick way of completing the binding. However, in this case, the delicate threads of the endband were not protected in the way that a comparable structure on a manuscript

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130 The plaiting appears to be worked across the spine width in threads of colour (head) as follows: 6 blue, 8 white, 7 blue, 8 white, 6 blue, 9 white, followed by an uncertain number of blue, straight (i.e. not forming part of the chevron) 5 white, straight 4 blue.
binding with chemise was protected (as in Peterhouse MS. 276). It is clear that the secondary working of a chevron endband was frequently formed to serve as a decorative and structural feature (as described) with no extra protection to prevent abrasion damage. For example, Corpus Christi College, Oxford MS 139 (Liber Aurelli Cassiodori ... 12th century, St. Augustines Priory, rebound in the fifteenth century probably in Oxford) has an exposed chevron secondary working, and Hereford Cathedral MS.P.8.vi, p.8.xi (Digestum Novum Glo., fourteenth century with a fifteenth century binding) has a completely exposed secondary worked chevron in blue and white, made after covering and encompassing the cover (Photograph 28).

Covered endbands

The final method of dealing with compound endbands in the English fifteenth century books occurs where the covering leather or tawed skin of the binding is cut off, but with enough left to take it over the compound structure. The cover is then sewn through beneath the band, thereby enclosing the band itself. In the simplest and most common examples, the sewing was probably undertaken with one needle. It was commenced at the centre of the spine and sewn in a straight line out to the joint areas of the text-block, then sewn back to the middle - effectively giving a figure-of-eight sewing configuration. At the centre of the spine, the sewing was continued to the other joint area and returned to the centre, whereupon the two ends of thread were usually tied together, trimmed and lost in the centre of the most appropriate quire. These covered bands were observed in 5% of the sample surveyed, and whilst they are probably more common in the latter half of the century they also occur in some numbers much earlier. They became very common in the age of the printed book, and remained in use into the sixteenth century and beyond (Diagram - Endbands 5).
Boards

Synopsis

As described in the general introduction to fifteenth century book structures, the outer surfaces of wooden boards used in making fifteenth century bindings were very rarely left flat. However, there was an immense range of board shapes used. The most common shape of the late medieval period is that known as cushioning. This shape has a continuous curve which falls away to an edge. Few books have cushioning which fall away to nothing at all (Clare College U 55 being an unusual example), most have a shape which takes the wooden boards from an average of 10 to 12 mm thickness to a vertical edge of around 5 to 6 mm. The vast majority of boards are of oak (a characteristic of most English medieval binding) a few have beech, Queens’ MS. 16 in elm being the previously mentioned exception. The boards provide evidence of different tool usage. Some of the bindings are obviously very provincial, if not rustic. Much of the earlier fifteenth century Cambridge work falls into this latter category. In the case of these books it is evident that the wood of the boards has been prepared locally by splitting the timber down the radials. The boards of many of these more simply made bindings were frequently shaped with the use of a cabinet maker’s axe or in some cases, a draw-knife. Some boards appear to have been very roughly hewn into shape.

Timber used

The most common timber used in the making of English and French medieval book boards was oak. However, other timber was also used and this becomes more apparent towards the end of the fifteenth century.

The importation of wood was considerable from the thirteenth century onwards. Oak from Continental sources was grown in forests which were not as well managed as those in England. For example, coppicing of all types of tree was prevalent in England from an early date, and timber was considered a much valued material throughout the medieval period (Edlin 1956 p.212). The close growing of the trees caused them to head
towards the light above the tree canopy, and gave rise to timber with more regular growth rings and with less knots. In England where the trees were cropped for extensive use in building and in ship construction, the trees were more widely spaced and sometimes grew in virtual isolation. As the building-timber of the medieval period, oak was in constant demand; it grew widely and its strength and durability made it ideal. In many cases those involved in the construction of buildings would simply fell trees in the neighbourhood of their work. Thus, at Peterhouse in 1438 the medieval builder used timber taken from the garden of the college (P.1438: 'for 1350 planks (tabulis) sawn from trees cut in the garden (orto) of the college') (Salzman 1967p.237). Similarly, in the middle of the fourteenth century, a wood was bought at Cagham which provided 3,004 oaks, this wood was largely used locally and worked whilst still green, which most likely made it harder to work. Such timber was not suitable for the manufacture of book boards without additional seasoning.

Where the forests were more sparse and where trees grew in virtual isolation, growth was more directly affected by seasonal changes, and the resulting timber whilst being in comparatively larger plank sizes was prone to varied patterns of growth reflected in the annual rings and in the number of knots present. In comparing English to Hanseatic League oak it would be wrong to suggest that one is intrinsically better than the other - they are simply a different type of the same material. But when one contrasts quarter cut oak from the two sources, the Continental source is superior because the regular growth rings give rise to a more stable plank in thinner form and therefore less prone to warping. When imported to England Continental oak had already been seasoned. The timber used in building in England, as previously mentioned, was usually used in the green state on account of its high acid content providing protection against insect infestation, whilst imported quarter cut wood was seasoned because it was needed for decorative rather than constructional work. For an explanation of the technique used in the analysis of different types of oak see Chapter 2. The trade in oak was largely organised by the Hanseatic League, and the bulk of the exports was probably grown in the Germanic
world (considerable amounts of timber came from Poland). Much came via the ports of the Baltic and the North Sea.

English oak was also prepared on the quarter from early medieval times, but especially from the second half of the fourteenth century onwards. Salzmann suggests that quarter boards were sawn from trunks that had been quartered as a means of making them of manageable size. If he is right, the quartering would have been achieved by dividing the trunk length-wise by medial cuts at right angles (Salzman 1967 p.242). The quartered timber of the fifteenth century found on English bookbindings appears, in general, to have been sawn, and this is another clue indicating importation, when annual growth rings cannot be observed on account of book covering materials.

In the survey the species of the timber could be identified in 225 examples of wooden book boards. This evidence was analysed to provide the following proportions:

- Oak 94%
- Beech 5.5%
- Elm 0.5%

It has been calculated that approximately 80% of the oak used in the making of fifteenth century book boards was from imported stock (based upon analysis of examples studied for this survey), and was delivered into England in plank form in thicknesses of about 15 mm. The imported wood was known by a number of terms (bord de Alemain, Estreche boards and so on) but that used in making book boards was probably a specific type known as wainscot board (deriving its name from the word ‘wains’, or ‘waggon’, in the construction of which the timber had become an established material) (Salzman 1967). Wainscot boards arrived in huge amounts during the fifteenth century. They appear to have been prepared in lengths of about 10 feet, and were also imported for building work - often in roofs (Symonds 1954 p.244). Much was brought to England as ship ballast.
The quality of the timber varies considerably from one book to another. It is true that in the majority of bindings examined a conscious effort had been made to use wood which was prepared on the quarter, but the accuracy of the quartering was found to be very variable, and in some cases the boards displayed no medullary rays or other evidence of having been cut on the quarter. For the proportions of wood prepared by splitting and sawing, the following impression is suggested by the evidence of the survey of fifteenth century book boards used in making English bookbindings:

<table>
<thead>
<tr>
<th>Method</th>
<th>Percentage</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quarter Cleft</td>
<td>26%</td>
<td>mainly English timber</td>
</tr>
<tr>
<td>Quarter Flat Sawn</td>
<td>50%</td>
<td>mainly Continental timber</td>
</tr>
<tr>
<td>Sawn but not on quarter</td>
<td>24%</td>
<td>mixed origin</td>
</tr>
</tbody>
</table>

The supply of timber

In the medieval period, home produced timber was selected by the carpenter, who would first inspect the trees and indicate which should be felled. The tree, once felled, would be stripped of its branches - the larger ones would be used as timber, and if necessary, the trunk would be pit-sawn using a two-man saw. Nothing went to waste - the bark would be used in tanning\textsuperscript{131}, and the remainder would be used as fuel or in the manufacture of charcoal.

In the examples of English oak book boards of the fifteenth century, it seems reasonable to assume that the wood was obtained from a carpenter by the bookbinder, and judging by the quality of the craftsmanship seen in the shaping of a few boards in some cases, all further work was undertaken by the binder. In some of the locally bound Cambridge books containing archival texts (e.g. account books and college ledgers), which demanded a

\textsuperscript{131} In fact, most oak bark used in tanning came from coppiced oaks grown especially for the purpose, the largest source of which was from the Highlands (Edlin 1956 p. 212).
sound and efficient but not attractive structure, one occasionally sees 'scapple' marks (i.e. faintly scooped areas on the surface of the wood where a plank was squared up on the face, and in some cases one sees a hollow in the face of the wood where the splitting action of a froe has caused the wood to tear along the line of the grain. (Corpus Christi College, Cambridge, Terriers - showing scapple marks and splitting hollow, and scappling depicted in Bodleian Library, MS Barlow 53 (R), Photographs 19, 29a-j and 30).

Board shapes

The shaping of the outer surface of book boards varied considerably in the fifteenth century, but overall there was a distinctive shape which can be described as Gothic as opposed to the preceding shape of the Romanesque.

The shaping of the boards was often achieved with one of a number of possible tools or with a combination. The cabinet maker’s axe was frequently used and its marks are often seen on the outer board face in circumstances where the inner board face has been planed or smoothed by some other means. In some cases the plane has been used on both faces. There can be no doubt that the draw-knife was also skilfully used in the shaping of many book boards, and the width of the draw-knife blade varied widely from one workshop to another.

It is very difficult to know to what extent the carpenter played a part in shaping the boards. The quality of craftsmanship observed varied enormously. One set of boards on a printed book belonging to Clare College (U 5 5) were so skilfully made and balanced that nowadays one might almost call them aero-dynamic. At the other extreme, boards exist rough hewn. These may have had a primary covering and thick chemise to conceal the roughness of the work (Photographs 31-32, Jesus College MS. Q.B.7). In one set of boards (Photographs 33a-e, Corpus EP. D. 4), there are a pair of holes midway across the lower and upper board which corresponds to no functional part of the binding, and one possible explanation is that the boards were pre-made and hung from the ceiling of the workshop.
awaiting the final cut to size, refinement and attachment. Evidence suggests that many metal fittings were imported into England for use on books, and one wonders if the binders of the late fifteenth century had various binding components to hand, partially pre-fabricated by other craftsmen. The standardisation of board shapes particularly noticeable in many early printed books suggests that this may have been the case.

Basic shapes

Gothic:

![Gothic cushioned board]

Romanesque:

![Romanesque chamfered board]

Having distinguished the overall shape of the Gothic board it is now necessary to explore the variety of shapes observed in fifteenth century English boards.

![Cushioned boards]

![Long cushioned boards]
short / cushioned boards

short / chamfered boards

long chamfered boards

Bevels:

1/4 bevel  1/2 bevel  3/4 bevel

Rounding:

1/2 Round  Round

Square

(These descriptions represent a synthesis of terminology by N. Pickwoad, C. Clarkson and N. Hadgraft. The terms have been defined here specifically for the purpose of interpreting the fifteenth century survey data, and responsibility for use of the terms in this context is solely that of the author).
The most common shape for wooden boards in the fifteenth century is undoubtedly the straightforward cushioned board, in which the head, tail, fore-edge and spine-edge areas of the outer board faces have been moderately shaped. The spine-edge is often more steeply cushioned in order to accommodate the joint and natural swelling in the spine area. However, there was a significant use of a straightforward chamfering technique which became far more common towards the last quarter of the century and is undoubtedly associated with the introduction of the printed book.

The long chamfer of the printed book age was almost certainly finished with a plane. It often gave rise to a rather flat-looking board, which frequently has a calliper of 10 mm in the board centre and falls to vertical walls of 4 or 5 mm at the board edge. A large number of books of the same period are similarly cushioned. The much more fiercely cushioned or chamfered boards, often associated with the late medieval period, were comparatively unusual, though they were by no means unique. In these instances, the chamfering or cushioning was achieved by quite harsh shaping - frequently hewn - and may typically have reduced the board thickness from 12 mm to 4 mm, or even to nothing, in an area occupying a half, or less than a half, of the ratio of space reduction area, compared to the long chamfer or cushion (this is known therefore as the short cushion or short chamfer - see diagrams above). The short shaping was frequently found in books which showed evidence of less careful work with less elaborate sewing structures than on other books. The work of Oldham’s Binder D at Corpus Christi College, Cambridge is a good example of a binder whose work has fierce draw-knife shaping and sewing on three stations, with boards which are not quartered. (Corpus Christi College, Cambridge, EP.D 1). Clare College U 5 5 however, has quite positively cushioned boards which are sharply reduced from a central board calliper of 10 mm falling to almost nothing at the edges. These boards are so finely shaped that the work must be classed as the finest possible on well quartered imported timber. It should be emphasised that the comments here are neither more nor less than generalisations.
The subtleties of board shaping are so numerous because they are the product of individual craftsmen. It is difficult to describe more than the main types observed, and to consider what these indicate in terms of production. The large numbers of boards prepared for printed books with a long chamfer made with a plane do strongly imply preparation by the carpenter, with the binder/stationer buying them - possibly in some quantities to fit the generally common book sizes. This theory is partly supported by the evidence of those boards which appear to have slightly imbalanced shaping in the areas chamfered or cushioned at the head or the tail, (e.g. where the cushioning at the head reduces the board to a thickness from 10 mm to 4 mm over an area of 4 cms, and where the tail cushioning reduces the board thickness from 10 mm to 6 mm over an area of 3 cms). It could be that the boards have simply not been shaped very carefully, or it could be that they had been partially shaped in advance and trimmed to size to fit a slightly smaller text-block, thereby causing an imbalance in shaping. It is a very common feature of late fifteenth century books, and the frequency with which it is noticed makes the evidence very persuasive. Modern bookbinders will explain from experience that controlling the thickness of the boards at the edge is a skilled task, and when dealing with large numbers of boards (as would have been the case for the late fifteenth century craftsman) the pressure of work may have led to a casual result.

The inexplicable holes noticed in a small number of book boards and which are nothing to do with clasping or lacing, here may represent no more than re-use of timber. Or they may represent some part of the board-shaping process, such as the fixing of the board to a surface against which the shaping can take place. Or, as previously mentioned, they may represent evidence of the hanging up of the boards from the ceiling of the
workshop whilst awaiting use as described for Corpus Christi College, Cambridge, EP.D 4³¹².

The prevailing trends in the shaping of fifteenth century book boards are fairly consistent with changes in the numbers of books being produced, and especially with the increase resulting from the introduction of the printing press. In this survey of books it is clear that cushioning was the dominant characteristic until 1475, with a rapid increase in the number of books with chamfered boards thereafter. In 1425 approximately 85% of the books surveyed had cushioned boards (of which 10% were long cushions and 10% were short cushioned, almost rounded) and 15% were chamfered. In the period 1440 to 1460, approximately 90% of boards were cushioned and 10% were chamfered. In 1475, approximately 50% were cushioned and 50% chamfered. In 1490, approximately 30% of the books surveyed were cushioned and 70% were chamfered. The potential limitations of a survey of three hundred bookbindings must always be taken into account, especially as one is sometimes viewing only a proportion of the whole group at any given time, but the overall trend does seem to suggest that by the end of the century a more mechanical approach to the shaping of the boards, using a plane, is a feature of the craftsman’s response to the increasing demands on his time.

The shape of the inner face of the boards is largely consistent throughout the century. The board edges are left square, although just occasionally one can detect a very slight bevelling of the edge, although this is never any more than a softening to accommodate the thickness of the covering material and is also rather unusual at this date.

The bevelling of the spine edge is associated with the spine shape and is evidently part of the whole process of lacing-on the board with tension to

³¹² This book has a blind tooled binding of rather poor quality, with tooling which is not recorded in any of the standard reference works. But whilst the work is crude there is no evidence that the boards have ever been used for another purpose or another binding.
produce a naturally rounded spine shape. In none of the books surveyed was there any evidence of the use of a backing hammer, and the only evidence of 90° joints occurred where the natural rounding had forced the endleaves at the joint area against a square spine board edge (Diagram - Spine Shapes 3). In England, at least, it seems that the backing hammer and the notion of rounding and backing was a distinctly post-medieval phenomenon, and it also seems likely that researchers who claim to be seeing rounding and backing at this date are being misled by the natural rounding action of Gothic lacing and board shaping. Examining a graph of the spine shape and setting it alongside a graph of the shaping of the inner spine board shape (bevelled or square), it is remarkable how the two sets of results correlate (Diagram - Graph).

The outer face of the spine edge of the board is usually cushioned rather than chamfered, even in books which otherwise have chamfered boards although this is not always the case. The prevailing trend however, follows the pattern described for that in spine shaping, with the spine edge of the outer board face tending to continue any rounding of the spine, creating the feel of a continuous curve. For this reason, it is not uncommon for the curvature of the spine edge of the outer board-face to be more acute than the cushioning on other board edges. The overall shape of the fore-edge of the boards always follows the shape of the head and tail edges.

The boards of many books vary from the upper to the lower in some detail, particularly in respect of the outer-surface board-shaping at the fore-edge where compensation is made for the different types of clasp fittings. For example, where an edge-mounted catchplate is found, the fore-edge wall of the lower board is often slightly thicker than that of the upper board. The spine edge of boards also sometimes varies in shape where the binder made an adjustment to compensate for the depth of a joint, or where the natural rounding of the spine demanded a continuity of shape on the outer board face. The casual nature of some board shaping and the variety of tools used seems to have given rise to numerous examples of
boards which do not exactly match one another, but which in overall appearance seem alike. It is not uncommon to find the head of a board reduced by cushioning to a different thickness at the edge from that found in the same type of cushioning at the tail. Variations in cushioning between pairs of boards is even more common than that within individual boards, in the sense that the upper and lower board may have different amounts of cushioning from one another as well as having differences within themselves head to tail to fore-edge. Where differences are very marked, it is reasonable to assume that the work is comparatively casual (unless there is a good reason for the imbalance, such as the presence of extra heavy straps for clasps).

Fifteenth century modifications to earlier bookbindings - changes in style and technique

During the seventeenth and eighteenth centuries, many medieval books were rebound. The huge rebinding programmes in Oxford and Cambridge largely obscured any evidence of early changes in the fashions of rebinding medieval books. However, large numbers of bindings from the Pembroke College collection (originally from Bury St. Edmunds) seem to have escaped eighteenth and nineteenth century rebounding and provide evidence of changing attitudes to the materials, techniques and structures employed in the rebinding of medieval books. In the fifteenth century, the fact that changes were made to earlier bindings makes the contrast between early medieval binding and fifteenth century binding all the more striking because one can see how the fifteenth century binder refashioned an earlier structure. Embodied in these bindings is clear proof that the medieval book structure had changed markedly by the fifteenth century. That there was a conscious effort to clean up the Bury St. Edmunds Abbey Library is clear from an examination of some of the manuscript bindings. It is possible that the increasing numbers of townsfolk who were allowed to borrow books resulted in the rebinding and refurbishing campaign of the fifteenth century (Gottfried 1982 pp.210-212). Many of the Bury St. Edmunds manuscripts contain inserted fifteenth century endleaves with titling and indices. Binding changes date from the same period. In
examining this collection, time and again, one finds examples of twelfth and thirteenth century bindings which have been re-covered in the fifteenth century and, under the cover, the boards have been rasped to give a steep cushioning shape characteristic of the late medieval period.

The collection of bindings at St. Gall Abbey in Switzerland have been surveyed extensively by Janos Szirmai. He notes that during the fifteenth century many of the bindings in the collection underwent major modification and in many cases total rebinding. The refurbishing of so many books is explained by Szirmai in terms of the Councils of Constance (1414-18) and Basle (1431-49) - the two great councils which resulted from the schism between the Pope, Cardinals and priests, and which channelled the reform movement within the Church. Szirmai observes that the work was undertaken as a result of the reform movements, and he notes that repairing and large-scale rebinding operations took place in many European monasteries. The example of St. Gall is a particularly helpful one because it is well documented. Szirmai was able to pin-point the work, to some extent at least, because he knew that the books had already been refurbished prior to the making of a new catalogue in 1461. He was also able to determine that the monks from other monasteries were instrumental in promoting the religious renewal within St. Gall, and he claims that, in all likelihood, it was the monks from Wiblingen in Bavaria who led the rebinding campaign (Szirmai 1992 p.165).

At St. Gall, of the 436 manuscripts dated before 1200, only 110 escaped the rebinding operation, 121 were rebound and the remainder were significantly modified, the alterations and the rebinding work all being done in the Gothic style. The boards were bevelled - rather sharply when comparison is made with the majority of the book boards observed - and all the manuscripts have the outward appearance of fifteenth century work.

Determining the extent to which the movement generated by the Church influenced binding in England is very difficult, though the presence of a large number of rebound and much altered manuscripts in Bury St.
Edmunds Abbey Library suggests that it could have been significant. However, whilst it is possible (though unlikely) that the Abbey at Bury St. Edmunds sent a representative to the Councils of Basle and Constance, it also seems unlikely that the movement would have been felt so remotely. The very critically located Abbey of St. Gall undoubtedly felt its full force. Bury St. Edmunds Abbey library is a particularly interesting one in respect to fifteenth century work. In assessing the work of Bury St. Edmunds, one must never lose sight of the fact that John Lydgate was a Benedictine monk at the Abbey, whose work was commissioned by the upper and middle classes of State and Church. His presence and the influence of John Whethamstede probably had more to do with changes in the library than did any Continental influence.

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133 The monastery at St. Gall in Switzerland would certainly have been far more directly influenced by such councils, and would have had more consequences to fear from them than would the comparatively remote Benedictine Abbey at Bury St. Edmunds. The geography of the locations would have been the most relevant factor in any enforcement of the Councils’ rulings.

134 Lydgate’s fame as the premier poet of his day owed much to the growth of commercial book production. Precisely where this production was located is a matter for debate. There is some circumstantial evidence for the presence of an active lay scriptorium in Bury St Edmunds, based upon the dissemination of Lydgate’s poetic works. When John Whethamstede, Abbot of St Albans, commissioned the making of a manuscript of the Life of St Alban (written for him by Lydgate) the closeness of the active monastic houses was amply exemplified (Doyle 1989 pp.117-118). Whethamstede was responsible for appointing a Grammar Master at St. Albans in an attempt to broaden learning and to turn the fortunes of St Albans Abbey where, in common with other monastic houses, the numbers of monks had been falling. By introducing a new base for learning and study the abbot sought to reverse the decline. Bury St. Edmunds Abbey must have been a lively focus for study in the fifteenth century - and the attention paid to its library seems a logical extension of this picture rather than an expression of some larger reform movement (Edwards 1989 pp.259-260, 268-269). This seems the most likely explanation for the massive refurbishing and rebinding of the library in the fifteenth century.
The modifications observed in the bindings at Bury St. Edmunds are not very different from those observed by Szirmai in the collection at St. Gall. The fact that many surviving bindings were affected and that they appear to have subtleties which imply a house style, seems to endorse the speculation of Pearsall and Edwards that there was a centre for the making of books at Bury St. Edmunds in the fifteenth century. The real proof of these assertions will not, as Pearsall and Edwards state, be possible until a much more thorough examination of dialect in manuscripts has been undertaken.

The Bury St. Edmunds fifteenth century bindings fall into three categories.

(1.) Those which were entirely new fifteenth century bindings.

(2.) Those which were rebound using earlier materials i.e. the thirteenth century tunneled boards.

(3.) Those which retain the earlier binding but which have been radically altered to provide the binding with the outward appearance of a fifteenth century book.

1. There are many examples of manuscripts in fifteenth century bindings with a fifteenth century text in the Pembroke College Collection. The bindings are similar, having a full cushioning and boards of about 10 mm calliper, but with an overall light-weight appearance on account of the shaping. The bindings often have a reverse skin primary cover and have all lost the chemise covering\(^{135}\).

2. There are a number of manuscripts with fifteenth century bindings made from the previous bindings which held the manuscripts. In the case of Pembroke College MS. 70, the twelfth century boards have been

\(^{135}\) Perhaps the chemises were deliberately removed at the time of their transfer to vertical shelving, at the end of the sixteenth century, and
removed from the book and have been rather crudely cushioned with rounded edges at the fore-edge, head and tail, probably with a carpenter’s axe. In the case of the lower board the tunnelled lacing paths of the previous binding have been turned to the fore-edge, enabling the board to be laced on in the new over-the-board-edge style into new wood. In the case of the upper board, the lacing has had to enter the same spine edge as the earlier binding on account of the deep recesses which had been cut into the fore-edge for the band and which prevented the lacing of slips into the opposite board edge (Photograph 34).136

3. In the case of Pembroke College MS 228, the thirteenth century binding has been left intact, with the original sewing and lacing in place. However, the fashion for bevelled boards has resulted in the fifteenth century binder reshaping the fore-edge, head and tail edges of the boards with the binding in-situ. The work looks crude, and the resulting appearance is the least convincing in terms of cushioning. The plank-like earlier boards of thick construction are very substantial and the early tunnelled lacing (having been retained in the full thickness of the board edge) lends the later work an anachronistic feel (Photograph 58).

Back Cornering

In the fifteenth century, back cornering of the boards was unusual, and is almost always very slight, usually being undertaken only as a means of accommodating the endband core as it passes from the text-block onto the outer face of the board. Essentially it is a post medieval concept in the possibly therefore at the time of the transfer of the collection to Pembroke College.

136 This binding was discussed with Michael Gullick at the time of its conservation, and he remarked upon the unusual way in which the binder had taken economy to an extreme. In re-using one of the boards he was being prudent, by re-using the other boards he was taking something of a liberty.
context of a cap being formed with the turn-in passing in between the
board edge and the extremities of a headband\textsuperscript{137}. With the first appearance
of the headband in the 1490s the binder was able to pass the covering
material down the back of the spine and back upon itself, as in modern
conventional covering. In the few examples observed it seems that some
back cornering may have occurred which was intended to cope with the
simpler form of construction and covering. However, viewing the
fifteenth century as a whole, it is clear that the vast majority of book boards
were not back cornered, unless one takes into account the removal of the
very tip of the board corner as a means of accommodating and assisting the
endband lacing over the joint area in a style descended from but not
reminiscent, of the Romanesque structure.

Board Finishing

The majority of English fifteenth century book boards were not especially
carefully smoothed after they had been shaped, and in the majority of cases
it is easy to see where the use of an axe or a plane has left marks on the
face. In some boards there are depressions in the board profile where the
action of a cabinet maker’s axe has torn the wood from the face of the
board along the lines of the timber growth rings. It was not impossible to
abrade the surface of boards, and very occasionally boards were found
which had been given a very smooth finish. Sandpaper was not a part of
the medieval carpenter’s tool kit. It is known that the skin of the dogfish
was often used for the purpose of rubbing down wood because of its very
rough scales and extremely tough skin (Salzman 1967).

The marks associated with the process of rounding board edges indicate
the widespread use of the rasp. However, the shaping of boards often

\textsuperscript{137} It is apparent in a different context, in the earlier period, as an
accommodation of a true endband, and is particularly worthy of mention
where the Romanesque endband is accommodated across the width of the
entire spine (head and tail) as part of a continuous structure feeding the
board edge entry tunnels.
involved working against the direction of the grain, and this can give rise to an untidy looking surface. This means that tools other than the rasp may be involved. In assessing tool usage, it is imperative to take account of the special qualities of the material being shaped as well as of the tool being used. In the pair of elm boards on the manuscript at Queens' College (MS. 16), it appears that a rasp has been used in board-shaping and it seems likely that this tool was used on account of the great difficulty involved in working with the special characteristics of this wood. In this particular case the timber used was of exceptionally inferior quality, exhibiting large quantities of loose fibrous grain - not uncommon in elm.

The previously mentioned rough hewn boards of Jesus College MS. Q.A.4 are not particularly unusual, and a good deal of ordinary local work was carried out in this way. The Jesus College book is a rather exaggerated example of the casual way of shaping boards, and this type of shaping in the fifteenth century context, seems to suggest that the work of shaping was probably undertaken by the bookbinder himself, rather than having been pre-formed by a carpenter as suggested for some of the more refined work.

Board Lacing

The act of lacing the wooden boards to the text-block by means of the band slips brings the critical structural components of the codex into a single working unit. It is the joining of the sewing to the wooden boards (in this type of book) which constitutes the foundations of the bookbinding, around which the cover/s and fittings completed the whole working object.

Before discussing the lacing pattern, it is necessary to remind ourselves that the slip travels along a short entry channel over the outer face of the board, and through a hole on to the inner face before travelling along a channel to be pegged at the end of the channel from the inner face of the board. The shaping of the entry channel is significant, and the location of
the drill holes is also relevant to an understanding of the quality and care with which the binding work was undertaken.

Entry channels and drill holes

In most cases, the outline of these channels was simply knifed in after the drill hole had been made, and was then simply chiselled or gouged out to the board edge within the defining knife lines to the depth of the slip thickness. In general, the channel tended to be either slightly fan shaped or straight, and thus to be cut slightly deeper towards the entry hole itself enabling the slip to pass discreetly through the thickness of the board without bulking at the entry point.

The drill holes themselves are usually slightly angled towards the board edge providing the sense of a continuum in the lacing route. The angling of the drill hole varied in the examples observed between 50° and 80° to the board face; the hole was rarely at 90° to the board face. The holes were almost certainly made with a bow drill (a tool which has ancient origins: the *Oxford History of Technology* shows an illustration from a Greek vase of a 6th century Greek cabinet maker using a bow drill) (Gille 1954 p.631). The holes sometimes show scorch marks although this is comparatively rare, and one imagines that the use of a heated tool had something to do with the need to remove swarf from the hole, as well as providing the craftsman with an opportunity to modify the hole and to assist with the angling aforementioned. Drill bits at this date had a cutting end with a sharpened tip, but the cutting face extended a comparatively short distance along the length of the bit itself. The resulting amount of swarf in the hole would have been significant on many occasions requiring scorching or some other form of cleaning after drilling (Photograph 35, medieval auger).

The competence of the binder in judging the depth and shape of the entry channel provides interesting insights into the quality of some fifteenth century work. In the case of the entry channels made for Jesus College MS. Q.A.10 something has gone awry. The fan shape of the entry channels is
completely wrong because the slips are narrow and not especially heavy. As a result they cross the middle of a channel profile which virtually gives rise to an equilateral triangle. Understanding how mistakes like this have arisen is very difficult, but the evidence does suggest a possible division of labour. The binding of the book is otherwise reasonably competent, and the sewing is conventional. Could it be that the cutting of the channels was not undertaken by the same person who sewed the book or who shaped the boards or who covered the book? Any competent bookbinder familiar with the sewing supports of the book would not have cut the channels in the shape discovered on this previously rebacked but otherwise untouched structure.

Lacing on the inner board face

Lacing on boards during the fifteenth century was most commonly observed in one of two basic forms or in a combination. The two techniques are known as straight and convergent and relate to the pattern of the lacing channelling on the inner faces of the boards. (Diagram - Lacing-in, a, b, c, d and e). Some boards were cut with left or right-handed lacing (or mirrored i.e. the upper board lacing corresponds in an opposite pattern to that of the lower board). Hence, in boards which have a right and left-handed style the lacing might be a combination of straight and convergent lacing as follows - VIVV (upper board) VVIV(lower board). If the same boards were not handed, the lacing would be cut identically i.e. VIVV from the head in both boards.

Describing lacing which shares a termination hole as being simply convergent can be slightly misleading, although it is a useful term which distinguishes a class of lacing pattern. The difficulty arises when one is referring to double bands, because the term can be used properly only to describe slips which are meeting slips from other bands, and it is possible for slips from the same band to fork and converge with slips from other bands (common throughout the late medieval period). The simplest way
of overcoming this problem is to describe precisely what is observed i.e. "the bands are anchored with the nearest neighbouring band"\textsuperscript{138}.

The variation possible in the angle of convergent lacing enabled the binder to combine straight with convergent lacing in two ways. The simplest approach was to leave one odd station - sometimes more than one independently of those grouped for convergent lacing. As described above this could be reflected upper to lower board, or not as the case may be. The second approach was to enlarge the angle of convergence and to insert a straight lacing channel in between the two angled lacings allowing it to terminate and share the same hole (Diagram - Lacing-in, f, g and j).

It has been observed by some binding historians that the slips seen travelling in the channels have been twisted within the channel itself. In all the books I observed, the presence of twisted supports within the channels had resulted from the turning-in of the supports at the time of sewing and therefore was not conceived as part of the lacing practice.

The fact that the Gothic bookbindings tended to be sewn on many more supports than the Romanesque or other previous structures gave rise to a new problem. The presence of a series of holes along one line of the board caused a significant weakening of the wood, and doubtless binders tended to find that boards could split along the line of the lacing. In order to avoid this problem many bookbinders staggered the lacing holes -i.e. they deliberately lengthened some of the channels so that not all of the lacing holes lay along the same line or they slightly varied the point at which the lacing entered the board from the outer face (Diagram - Hybrid Late Medieval Book). In the fifteenth century, they did not vary the location of the hole through which the slip entered the board to any significant extent except in the case of those boards with long tunnelled lacing, because the mechanics of board operation would not permit such a modification.

\textsuperscript{138} Method of description devised by Christopher Clarkson.
Peterhouse MS. 144 contains texts of the late fourteenth and early fifteenth centuries. (Ps. Chrysostomi opus imperfectum. Homiliae Chrystomi). The book is sewn on six stations, and the boards are quite steeply cushioned on all edges, although the shaping on the spine edge is somewhat less severe. The binding appears to be undisturbed and the primary cover, though a little damaged with a partially detached board, is original. The original chemise has been lost. The upper board pastedown has been lifted and there can be no doubt about the nature of the lacing. The manuscript is a very late example of what has been termed Anglo-Norman Long Lacing.¹³⁹ The tawed slip enters the edge of the board and passes through a tunnel with a thin bridge and travels in a channel 30 mm long, on the outer board face, before passing back through the board and along an inner board face channel which is 25 mm long, and finally oak wedged in a narrow oblong chiselled hole (Photographs 36-39).¹⁴⁰ The boards have a centre calliper of 12 mm and are cushioned to an edge of 4 mm, thus displaying the typical Gothic shape and overall appearance. The weight of the sewing supports used in the making of the binding has far more in common with that of the fifteenth century than with the earlier period, for the board channels are approximately 8 mm in width. The endbands are laced in typical

¹³⁹ This is a term obviously referring to the heavy bands laced through tunnels in Romanesque bindings. In recent conversation with Christopher Clarkson, it became apparent that he too had observed the practice of utilising tunnelled lacing on late medieval English bookbindings with much slighter and more numerous supports. Notably, he had recently observed this feature in a binding now in the possession of the Bodleian Library.

¹⁴⁰ There are many examples of thirteenth and fourteenth century Italian tunnelled lacings of comparatively light construction. There is one example of a board with head, tail and fore-edge clasping, and observed in isolation, which is inevitably classed as Italian on account of this. However, the board is of oak and similar bindings (with clasping head, tail and fore-edge) can be seen in the catalogue of Early Spanish Bookbindings XI-XV Centuries, by Henry Thomas, Illustrated Monographs by the Bibliographical Society, No. XXIII, 1939. Therefore this practice of tunnelling was probably also prevalent on the Iberian peninsula, and the board in question, being of oak, is most likely Spanish.
fifteenth century style to a single hole on the outer board face in a V shaped channel. The substance of the endband core is also typically of thin pre-twisted tawed material.

The example of tunnelled long style lacing found in the survey of bindings is not an isolated one, and, with Pembroke MS. 45 and examples at the Bodleian Library, proves that the technique continued in modified form throughout the Middle Ages. In the case of Gonville and Caius MS. 166.84, mentioned previously, the book was resewn in the fifteenth century to include additional tracts; since the thirteenth century binding with tunnelled lacing has been re-used this may therefore be considered as a
separate problem. The fact that the book was undoubtedly resewn in the fifteenth century is proven by the fact that the fifteenth century texts incorporate a continuous sewing without kettle-stitch and climb from quire to quire under the covering of the endband.

**Proportions of lacing patterns**

Analysis of the survey data shows that in the first half of the fifteenth century about 61% of bindings observed incorporated convergent lacing, and 39% were laced solely in the straight fashion. By 1450, the survey indicates that convergent lacing was still the predominant form (60% convergent 40% straight). The picture changes dramatically when one starts to examine the post-1450 period and by 1465 the ratio has reversed. By 1475, the proportions are 75% straight and 25% convergent. By 1490, the convergent lacing had been reduced to a mere 10% of the sample. It is clear that the binding of early printed books dramatically altered the balance with the use of short straight chiselled channels. This is another example of the bookbinder conforming to an established pattern and routine. It is almost as if the quantity of books with which he suddenly found himself confronted has caused the bookbinder to vary his approach with a routine involving the use of a contemporary established technique. Thus, once again, we can see the introduction of standardised practices.

**Spine Shape**

(Refer to diagrams of spine shapes)

A number of bookbinding historians have referred to the question of the rounding and backing (i.e. the artificial shaping of the book with a backing hammer as opposed to the natural shaping of the book via its boards and lacing) of books in the fifteenth century. Janos Szirmai believed that he had observed this phenomenon on books seen at St. Gall Abbey in

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141 It is likely that the original supports have been used again, because they fit the lacing channels exactly and are of a weight and dimension more
Switzerland, and Michael Gullick also records the presence of books which have been artificially backed in his description of the fifteenth century bindings at Hereford Cathedral. On the other hand, the late Roger Powell expressed the opinion that the artificial rounding and backing of books was a phenomenon linked to the introduction of paste-boards, and was therefore a feature of the sixteenth century and beyond.

In all the books observed for the survey in Cambridge, the shape of the book was never formed by the use of a hammer. The books often had a round shape to the spine, of one sort or another, but this was always created as a natural development of the secure lacing of the text-block into wooden boards. The use of a backing hammer to induce artificially a round shape with board joints seems more obviously to be associated with the post-medieval tradition of bookbinding as Powell implied. It is not difficult to detect the difference between a book which has a lacing formed in a natural round and one with an induced round. The former will exhibit an intimacy between board and text-block which will assist good board leverage - i.e. when the board is turned back from the text-block it will move with the opening leaves of the book (unless, of course, the binding has been disturbed with broken slips and lifted pastedowns etc.). In the case of a rounded and backed spine, the induced shape will not display the same degree of intimacy, for the rounding will have been created before the boards were attached and as a consequence there will be more of a sense that the boards are attached to the slips, rather as a door is attached to a door-frame with hinges. Backed books tend not to produce the same movement in the text-block as the book is opened and used. In backed books the text-block will tend to lie slab like and unaffected by the opening of the book in the absence of good board leverage. Additional clues to observe for the presence of rounding and backing concern the presence of spine-folds which have clearly been crushed and distorted in such a way...

\footnote{Hadgraft's terminology.}
that only a hammer could have delivered the force and angled blow necessary to create such a pattern of shaping. Hammer marks are not uncommon where the spine is exposed (Photograph 40). The naturally induced curvature of laced spine shaping is always even, and only where the flyleaves of the text-block are occasionally trapped between the board edge and the curvature is there an implied joint.

The only medieval books observed with rounded and backed spines were those which had later repair work by a trade bookbinder in the nineteenth or twentieth centuries.

Evidence from the survey of English fifteenth century bindings suggests that the flat spine was still a very common shape in bookbinding, and approximately 50% of books had flat profile spines in the fifteenth century. The moderate round was also common throughout the fifteenth century, with at least 45% of books displaying this shape. The remaining 5% of books observed had spines which exhibited either a slight round or, far more rarely, a very distinctly round spine shape. The shape of the spine seems to have been largely unaffected by the introduction of printing.

The spine shape often seems to have resulted from the bulk within the text-block, and this is to some extent the determining factor. The extra thickness has to form a round in order to accommodate the difference between spine and fore-edge thickness. In this respect, there is a very significant difference between some late medieval text-blocks and earlier examples. This is largely because the multi-quired text-block of thinner and more numerous quires produced greater bulk in material and sewing.

Text-block Edges

The preparation of the edges of textblock leaves was generally fairly casual throughout the late medieval age. However, special books did receive exceptional treatment. The painting of book edges was not common but excellent examples do survive. At Trinity Hall, for example, there is a manuscript with edge painting which has come to light following resewing as part of a conservation exercise, where the nineteenth century
sewing had obscured the image. In this thirteenth century example one can see the heraldic leopards of England, in colour, running along the length of a fore-edge which incorporates the arms of England and France. (Trinity Hall MS. 17) Mirjam Foot has written on the subject, and believes that these exceptional edges, particularly on devotional works, were not as rare as at first considered (Foot 1996, pp. 260-267).

The fifteenth century saw a transformation in the way in which books were bound. This transformation broad and general as it was, is rooted in even more profound social changes taking place during the period. In the course of this research, I found a rebound fifteenth century manuscript with a gilded edge at Corpus Christi College, Cambridge. At first, I thought it must have been gilded long after production. Then I thought that the gilding may have been a sixteenth century addition by Parker who had a special reverence for the book in question, believing erroneously that it was of the seventh century, with a provenance to Theodore of Canterbury. However, the gilded edge is intrinsic to the production of the book, and demonstrates a desire on the part of the scribe to produce a manuscript resembling in its entirety an Italian humanistic manuscript143.

The manuscript concerned was undoubtedly written by John Pacy (Chaplain at Canterbury) about 1464. The book is a classical work of Cicero, and we know that the date is roughly correct because Pacy was also the scribe of a manuscript now in the possession of Pembroke College, Cambridge which is dated John Pacy 1464. The Pembroke MS. 235, which is also written in the Italian style, has no decorated initials or gilt edge, and is a copy of Guido de Columna i.e. another classical text. However, the Corpus manuscript is very handsome with a beautiful script and historiated initials.

143 Professor de la Mere of King’s College, London offered a great deal of practical advice about this volume, and as a result of this advice I am convinced that the edges of Corpus MS. 158 are contemporary with the first binding.
The fact that the book is a classical text may be relevant, for this obscure Chaplain at Canterbury may have been trying to reproduce examples of similar texts which he had seen and which had been made in Rome. It is clear that his dedication to the making of books was part of his vocation, and in this respect we must examine his work for more than one reason. Corpus Christi College Cambridge MS. 158 is interesting in so far as it reveals more about the development and making of books in fifteenth century England in general. It is also interesting because it can tell us generally more about the making of books in one of the great devotional centres of the medieval age. In the latter respect, the book reflects the religious and social history of the fifteenth century, and in trying to explain specific features we are led to understand better the interrelationship between faith, craft and pilgrimage. The book was acquired by Matthew Parker, presumably whilst he was Archbishop of Canterbury, and was subsequently bequeathed to Corpus Christi College in his famous will.

The fifteenth century centres of pilgrimage were fervent and vital elements in the Christian world. It was the wide appeal of the pilgrimage which brought prosperity and viability to these great centres. Canterbury was certainly no exception! The collapse of Byzantium in 1453, preceded by two appeals to Henry VI (England's so called incompetent King), shows not only the extent to which the European world was open to an exchange of ideas, but also the ominous message which was carried, and the vital importance of self-sufficiency for the great centres of pilgrimage. Canterbury would have been actively encouraging the influx of pilgrims, ideas, goods, crafts and money.

The gilded edge on MS. 158 can be classed contemporary, partly because the book was made in Canterbury by Pacy. Moreover, it is on English calf parchment, which he undoubtedly procured. The parchment appears to have been made to resemble as closely as possible a good clean Italian goat skin parchment characteristic of so many humanistic manuscripts from southern Europe, but there is no mistaking here the heavier nap and the
tell-tale veins which identify MS 158 as being of calf parchment and almost certainly of English manufacture.

Professor de la Mere assured me that there was no evidence to suggest that Pacy ever travelled outside England, let alone to Rome, and therefore we must assume that he learned his Italian humanist hand from a scribe who came to him rather than the other way around. The question arises as to whether he also executed the historiated initials, and whether he is responsible for the gilded edge. It seems unlikely that he was responsible for the whole work.

There may well have been an overlap between monk, craftsman and pilgrim, and therefore, to find a gilded edge on a fifteenth century book written on English parchment and made in Canterbury should not really be the surprise that it is. Continental examples of books with gilded edges at this date are not uncommon, particularly from Italy, the Low Countries and the Germanic world. The work on MS. 158 is fine and accomplished. Arguably it is a later addition, but there can be no proof of this - one way or another.

The gilded edge and the illumination may be the work of an itinerant craftsman travelling from Europe, or the book itself may have travelled from Canterbury to another centre for decoration. The gilding is a great surprise because it is the earliest gilt edge known to me in the English context.

The initials are quite significant in understanding the gilded edge. The letter is in gold leaf which has been burnished. The coloured foliage (pale brown) surrounds it on a ground, partly coloured, of blue and red dotted with white: these grounds have sharply cusped edges. There are finely painted grotesque figures, in grisaille, and dragons. The use of a 200 X microscope and infra-red photography has helped us to narrow down the range of possible pigments used and establish some of the inorganic possibilities. A question arises as to the origins of the initials. It is interesting to note that the blue is of the cheaper, but still expensive,
pigment azurite rather than of lapis lazuli. This is to be expected at this date, and correct for northern Europe, but still contrasts with the quality of the work. The blue used in the King's College, Cambridge Charter at a similar date, by an English master, William Abel, is all in lapis lazuli.

The initials in the Pacy manuscript, whilst being of good quality are unlikely to be the work of an Italian artist, because the book seems to be a copy of the Italian style by an English scribe. But we cannot be sure that Pacy was responsible for the manuscript as a whole. Very careful scrutiny of the historiated initials suggests that we are observing the work of a very accomplished artist, whose use of gilding is professional. Arguably, these skills were beyond Pacy's ability, unless our knowledge of him is completely inadequate.

It is well known that manuscripts were sent from one centre to another for decorative work to be undertaken. For example, Dr. Patrick Zutshi, Head of Manuscripts at Cambridge University Library, recently told me of an Italian manuscript now in the possession of his department which was evidently decorated near Toulouse, but written in Rome at a comparable date to the Pacy manuscript.

It is necessary to consider whether or not Corpus MS. 158 was sent from Canterbury to a Burgundian or Netherlandish centre for the work on the historiated initials to be undertaken - and therefore the edge gilding may also have Continental origins. The answer to this question must always be - possibly. However, in all likelihood the manuscript probably never left England, and the work on the initials was undertaken locally, imitating the Italian style, by a very accomplished scribe who had familiarised himself with the entire concept of the humanist manuscript. The craftsman evidently went to the lengths of gilding the edges of the binding. Could this have been Pacy?

If one examines book edges of the fifteenth century, and the survey involved examination of hundreds, it is obvious that in general the preparation of them is - on the whole - rather casual, so much so, that it is
often difficult to decide exactly how they were cut. In the case of paper text blocks it is usually easier because one tends to find more evidence of knife marks and of the bookbinder’s plough.

Preparing the smooth surface needed for gilding the edges of Pacy’s vellum manuscript would have required much skill. It seems unlikely that the Canterbury Chaplain could produce one uniquely beautiful example of edge gilding and decoration. The very uniqueness of this book in the context of its scribe, therefore provides evidence by its very existence in isolation.

It has been suggested that the manuscript may have been given its gilded edge after the fifteenth century, but this is extremely unlikely. The edge has been prepared very close to the extremity of the leaves, prior to gilding. In one or two places, the gilded edge is slightly affected by the pricking marks, and I am sure that the manuscript has therefore never been trimmed other than for the gilding itself and then only to clean the extremity of the leaves. I feel sure that a sixteenth or eighteenth century edge would have involved a much more severe trimming. The book has been in the continuous possession of Corpus since 1575 and a post-sixteenth century gilding is virtually impossible, because all subsequent work undertaken by the college on its manuscripts was (until the last ten years) of a basic trade type, involving the use of simple printed book type aesthetics (e.g. 1/4 calf with vellum sides, eighteenth century, full undyed Nigerian goat skin, twentieth century,). No Cambridge College would ever have gone to the expense of special edge gilding for a book in its collection which was not of the first rank - especially when it did not do so for those in its first rank\textsuperscript{144}.

It is true that a number of books were given more elaborate bindings just before the 1939-45 war, but MS. 158 was not amongst them. It is of course

\textsuperscript{144} The activities of Frognall Dibdin are not significant in the Cambridge College collections, except in so far as they affect nineteenth century benefactions to college libraries.
possible that the book acquired its gilded edge in the sixteenth century, but again there is no precedent for this amongst the Parker manuscripts, and I think that the edge is far more aesthetically in harmony with the style and nature of the manuscript itself than with any subsequent manuscript re-binding. At present it is not possible to tell how many times the book has been rebound, but if a decision is taken to re-sew the book anew in order to try to regain some of the original qualities of the gilded edge, we should be in a stronger position to examine the binding history of the manuscript.

This is probably the earliest known example of an edge-gilded book made in England, or perhaps a book written in England and gilded elsewhere for specific English use. It is an edge which must be viewed as part of a whole aesthetic production, determined to copy a style of binding made in Rome, and one which presents no problem to the palaeographer who has witnessed similar mimicking in lettering and decoration. Therefore in all likelihood this is an exceptional edge which was made in England on a text-block which has never left English shores.

In general, the survey revealed a casual approach to the treatment of text-block edges. In the manuscript period it is sometimes difficult to tell exactly how the edges were cut. In the age of the printed book, it becomes clear that the bookbinder's plough was in use and the use of the draw-knife is also more in evidence. The survey revealed that at least 30% of printed books exhibited evidence of the plough being used, and the remainder were knife cut. Some parchment manuscripts also exhibit the use of the draw-knife.

The incunabula period involved the widespread use of organic stains to decorate the edge. Yellow was the only colour revealed by the survey, and was found on 46% of the printed books examined. The staining was achieved after the book had been trimmed and whilst it was locked in a screw press of some sort or another (there was little evidence of the colour bleeding into the leaves). The yellow concerned was frequently very faded and often only evident on the tail edge, indicating that this was not a light-fast colour (perhaps extracted from a pigment such as unripe buckthorn).
Dark red colours were also seen on incunabula books, but I am sure that this is a nineteenth century addition of the earth pigment commonly known as Venetian red. It was added to large numbers of important books in the nineteenth century to emphasise the importance of the book, of the owner, and of the library which held them.

Covering

The primary cover

In discussing fifteenth century wooden boarded books the most commonly used covering materials were tanned leather or tawed skin. The use of tawed skin in the covering of bookbindings was very common throughout the Romanesque and Gothic periods. In bookbinding terms the material had distinct advantages over tanned leather, and any drawbacks were definitely not relevant to the structural aspects of bookbinding.

Tawed Skin

Tawing is an ancient process of treating prepared hide or skin. The majority of skins on English fifteenth century bookbindings were sheep, although calf and goat were also observed. On the Continent, large amounts of pigskin were also used. Tawing of the skin occurs as it is impregnated with aluminium salts from potash alum by prolonged immersion in an aqueous saline solution at a temperature of 20° to 30° Celsius. The saturated skin is crusted (dried) in normal atmospheric conditions, and is worked with egg yolk to improve suppleness. It is then staked to re-introduce the natural flexibility. The skin is not converted into leather and, in theory it is possible with sufficient washing to remove the alum salts, returning the skin to the rawhide state (Etherington 1982 pp.260-261). However, William Fisscher of Cowley’s Parchmentmakers in Newport Pagnell, who makes alum tawed skins today, says that he finds the reversal almost impossible.

The process of tawing is somewhat shorter than that of treating calf skin with an oak bark tannage, although it is still a lengthy process probably
lasting between eight months and a year from start to finish\textsuperscript{145}. The amount of equipment, space and additional materials required to undertake tawing is less than for the manufacture of tanned leather; a parchmentmaker could fairly easily become proficient at preparing tawed skins. Perhaps the manufacture of tawed skins and the making of parchment were viewed as being interchangeable according to the demand of the moment. The material was almost certainly made in monasteries in the twelfth century and earlier, as was parchment. It is probably no coincidence that the use of tawed skin, though surviving into the modern period, declines significantly as the printed book gradually eroded the demand for parchment. However, it should be emphasised that there is no historical or archaeological evidence to prove that tawed skin was made by the parchmentmakers, and the suggestion that this may have been the case is based on the experience of twentieth century manufacture, which merely implies that it could have been a logical overlapping of manufacture in the late medieval age\textsuperscript{146}. There can be no doubt that tawyers existed in their own right, appearing in books of trade, and being subject to criticism from tanners and allied crafts. The skins used in the manufacture of tawing were generally considered inferior by the tanners, and embraced the skins of species of animal beyond the remit of the tanner. The irony is, that it is the tawed skins which, on account of the processes involved, have survived the longest and proved the most durable (Thomas 1983, pp. 1-8).

\textsuperscript{145}The process used at Cowley’s of Newport Pagnell today, takes about eight months.

\textsuperscript{146} Nevertheless, the fact that the use of tawed skin falls away in parallel with the decline in the use of parchment would seem to support the idea that the two materials were to some extent linked in production; because it is possible that as one material went into decline so the other followed - both surviving at a reduced level. The parallel is quite marked in this particular pair of examples. It must not be implied that either material disappeared completely, for they remained in quite widespread use during the sixteenth century and beyond - there was simply a significant decline.
The qualities of tawed skin are uniquely suited to the structural demands of good bookbinding. Tawed skin does not deteriorate as quickly as tanned leather (it is therefore ideal as a sewing support as well as a covering material), and it tends to be immensely strong especially when compared to tanned leather. The skin is resistant to dyeing but can easily be surface stained with an organic dye such as kermes, weld or woad. Staining of white skins on bookbindings was common (often undertaken after the book had been covered with traces of dye observed on board surfaces). The use of bright organic dyes to turn the white skin pink, blue or yellow must have provided many libraries with attractive and striking bookbindings. Contemporary illustrations of books do provide some impression of the colourful fifteenth-century bookbinding (Photograph 41).

In theory, the different chemistry of tawed skin and tanned leather would make them in-compatible in use as finished products; however, in practice the materials were combined in the making of bookbindings and seem to have survived well enough. For example, it is not unusual to find a tawed chemise with a skirt edged in a tanned piping (a twelfth-century example is at Queens' College, Cambridge, MS. 2), or even a tanned hide binding with tawed piping (a fourteenth-century example is at Corpus Christi College, Cambridge, MS. 212, Photograph 42a-d). This mixing of skins was common from a very early date and is obvious in Romanesque work as well as in the late medieval period.

Given the great strength and other advantages of tawed skin, it is reasonable to ask why leather remained in such widespread general use. It has been observed that tawed skin is not as stable as leather in the wet condition\(^\text{147}\), and can be changed by continuous wetting and washing. It is very durable and was used in gloving and in clothing but probably not in cordwaining for obvious reasons. Since, tanned leather, on the other hand,

\(^{147}\) The stability of tawed skin in the wet condition is variable, and largely depends upon the nature of the fat liquoring of which there were a number of alternatives in use.
is resistant to wet conditions (although it too can harden if soaked) it was the preferred material in saddling and shoemaking and was also widely used in clothing and in the making of tools. It is worth noting that the quality of tanned leather in the medieval period was in all likelihood, despite the alleged by poor animal husbandry, of significantly better quality than its modern equivalent on account of the slow tannage methods employed. Leather was undoubtedly in widespread use in circumstances where tawed material would not be appropriate or suitable.

The blind tooling of tawed skin with heated decorative tools is not impossible and can be occasionally observed, but the use of gilding is virtually irrelevant. Decorative bookbinding with gold calls for a different covering material, one which provides more contrast and greater compatibility of materials.

Tanned leather

Tanning is the conversion of the collagen and related proteins of animal skin into leather by immersion in a solution of vegetable material and other organic constituents, which causes a chemical change. In the case of historic bookbinding leathers, it is believed that the manufacturing technique involved oak tannage in a series of pits.

The hides were purchased by tanners from the butcher, and were carefully cleaned. Hooves and horns were frequently left attached and the tanner would remove and discard these, or sell them. He would also remove any remaining dung, meat, blood or packing salt. Skins were often washed in the nearest river, and it is not uncommon to find complaints recorded about the tanner . (River Colne - Victoria County History, Essex, ii, 459; (Cherry 1991 pp. 295-318).

As with parchment and tawed skin production, the process of making leather involves the depilation of the animal skin. In the case of preparing skins for tanning, this could be achieved by stacking hides hairside inwards to encourage the first stages of putrefaction in which the roots of the hair rot and loosen it. In this method urine was often added to
accelerate the enzymatic process. Alternatively, an alkaline liquor was prepared from lime or wood ash. The liming process involved steeping the skin in lime for several weeks, and the subsequent removal of the hair with a blunt (to save damaging the grain surface), two handled, curved (slightly concave-edged) knife (most likely worked over a beam). The flesh side of the skins was scraped with a two-edged fleshing knife. After washing and re-soaking, a blunt, scudding knife was used to remove any loose excess matter from the skin. Marks of this type were observed on the reverse face of book covers, and demonstrate the skill of the currier in

148 Pairs of liming pits have been found at a number of archaeological sites known to have been tanneries (Allan 1981).

149 It has been asserted that the more durable properties of historic oak bark tanned calf skins may have arisen from the traditional long liming time producing a larger residual deposit of calcium within the skin prior to the actual tannage. However, it is impossible for us to establish the true reasons for greater durability of early tanned leather, some of which has remarkable flexibility and complete stability - see for example the tanned goat skin on the Corpus Christi College, Cambridge bookbinding bearing the arms de Thou and dated in terms of his marriage to his first wife i.e. 1587-1601, or on the Anglo-Saxon book satchel at Corpus Christi College, Oxford. In the case of the de Thou binding, the leather is a high quality Morocco, which should perhaps be described as Turkey leather and has an implied Islamic origin. The book satchel is, of course, made of heavy tanned calf skin of English origin.

It seems more likely that no single cause of strength and durability can be asserted. Possibly it is a combination of factors. The breed of animal used, the conditions of animal husbandry for certain specimens, the care in selection of an animal skin of the correct thickness and age, the length and intensity of the liming process, the degree of acidity in the tanning liquor, the length of time during which tannage occurred and the number of tan liquor changes are all variable factors which will have contributed to the qualities of any tanned leather - and that is before any consideration is given to the historic and modern conditions of storage and to such factors as atmospheric pollution.
providing the fifteenth century binder with an even 1 to 2 mm. thick tanned calf skin. Supplies of such leather must have been prepared for the specific purpose, and undoubtedly helped the binder avoid much time-consuming paring. In many cases it was obvious that the binder had merely edge-pared the covering leather. The use of thin covering materials had been common from an early date, and in the case of the great Romanesque bindings with a chemise, one practitioner noted how thin were the primary coverings of alum tawed skin\(^{150}\). Nevertheless, in the late fifteenth century the demand for large amounts of tanned calf skin suitable for bookbinding must have involved the tanner and currier in ever higher levels of production, and this too led to a feeling of strain and change. There is also the need for a standardised approach to binding and the usage of materials in these observations.

The de-haired skin had to be rendered open to the tannage itself. Methods used to prepare skins for the tan liquor tended to involve the use of foul smelling and unpleasant materials, which to some extent accounts for the generally unpopular reputation of tanneries. The skins were sometimes immersed in a warm infusion of bird droppings or dog dung\(^{151}\). The process provided the skin with a suppleness and grain flexibility. The lengthy traditional process with its rather distasteful methods, undoubtedly provided good leather, as the comparatively high numbers of surviving fifteenth century tanned covers demonstrate. The special

\(^{150}\) Dr. Sidney Morris Cockerell first commented on this fact to Christopher Clarkson whilst working on the conservation of certain Romanesque bindings in the Pembroke College collection at Cambridge.

\(^{151}\) Dung was known as pure on account of its purifying potential. As late as 1851, Henry Mayhew records the work of the Pure-finders, noting that the dry limy looking sort of dog dung fetched the highest price, as it was found to possess more of the alkaline, or purifying properties. Pure-finders who were granted permission to cleanse kennels, obtained a good living from the work, earning as much as 10 to 15 shillings per week in the mid-1850s. These facts give us some idea of the importance of this part of the process, and even in the nineteenth century of the extent to which the industry still relied upon traditional techniques (Mayhew 1961 pp.306-7).
qualities of fifteenth century tanned leather resulting from the localised sources of manufacture and from the various types of tanning used, also provide some clues about the origins of the leather.

The deliming, puering or bating process conventionally produces a pH of around 4.0 to 5.0. In some cases the de-limed skin was treated to a mild acidification process involving a drenching of fermenting barley or rye to which was sometimes added stale urine or beer; in later centuries acetic acid was also used. After the skins had been washed again and sorted to ensure that coarse grained skins (which would have absorbed the majority of the tanning solution) were not mixed in with the better finer grained skins, they were ready for the tanning process. First, they would be placed in handling pits where they were exposed to comparatively weak concentrations of tanning liquor. The liquor was made by infusing the tanning agent (commonly bark of the Quercus species which can produce 10% liquor per unit of its volume) (Cherry 1991 p.297). The skins were moved around at least daily whilst in the handling pits, in order to provide an even uptake of the tannage and in order to achieve an evenness of colour and appearance.

At successive stages of the handling process, the skins would be moved from one handling pit to another, should a number have been available, and with each move the concentration of the tan liquor exposure was made a little stronger. The weaker solution through which the skins had already passed was not wasted but could be used again for the treatment of skins at an earlier stage of tanning. It was imperative that the tannage

\[\text{152 In an example of tanneries in the West Country (J and F. Baker Ltd., Colyton, Devon and Croggons Ltd., Truro, Cornwall) Linda Lee mentions that the process became more sophisticated (date of tanneries not specified but description implies a circa 18th century arrangement) when the tan liquor was pumped by water wheel through a series of pits in what is termed a round, the skins being introduced to the weakest pit first and being progressively exposed in a three month period to stronger concentrations of liquor on a weekly basis. The weaker concentration of liquor is reached as the more highly tanned skins have absorbed} \]
penetrate the entire thickness of the skin for the preservation of the leather to be assured, and the eveness of tan liquor uptake in the comparatively gentle traditional process, as opposed to a sudden exposure to strong liquor, ensured that the leather retained much of its inherent strength whilst achieving full tannage. The failure of many modern tanned leathers is almost certainly explained by the radical and fierce nature of accelerated tannage using chemicals, which produces a uniform product but is often characterless.

In contrast, the fifteenth century leathers do have many qualities which allow the historian to speculate on the sources of a specific binder's material. It is obvious that some skins used by named binders are from the same tannery. The work of Cambridge binders in the late fifteenth century is especially helpful in providing evidence of this. One excellent example can be observed in the work of the Unicorn Binder. Batches of leather can be identified on sets of volumes with his bindings, and these can be matched to other bindings from his workshop dating from the same period. (See Corpus EP.C.7, EP.D.10, EP.G.5 and SP.54). Further, it is interesting to note that the leather used by the Unicorn Binder looks remarkably similar to that used by the Cambridge Octagonal Rose Binder at the same time, in making a set of four bindings (Corpus EP.C.5 a,b,c and d).

It is worth considering whether attention to the colour of the tanned skins in the handling pits could affect the colour of the finished leather, even after dyeing at a later stage. It was noted during work on the survey of books for this research that leather used in bookbinding varied in shade and depth of colour according to the location of binding. This traditional approach to tanning helps to explain how tanneries produced a leather with characteristics special to themselves.

\[153\] Graham Pollard, in referring to comments made by E.G. Duff and J. B. Oldham, also mentions that tanned leather bindings from Cambridge tend to have the warmth of red about the brown shades (Pollard 1970 p.208).
Oxford had a rather more yellowish hue when dyed brown giving it the warmth of walnut brown, compared to that from Cambridge which tended to be redder giving a brown skin of almost mahogany colour. Books bound in London tended to have a more intensely dark brown colour showing little of the natural underlying tannage colour. The subtlety of these differences seems to have more to do with the way in which the leather absorbed the dye than with the colour of the dye itself, and for this reason it seems likely that the marked regional differences have much to do with local tannage practices, with the natural water present in the area and with the source of skins than it does with the nature of dyes used. It has long been asserted by modern tanners that overly prolonged vegetable tannage adversely affects dyeing and finishing. In reality, this seems more of an acknowledgement that the nature of the tannage has a profound effect on the finished material and consequently on how the dye was absorbed. It must be something to do with the way in which the water used in manufacture, the technique employed and the chemistry of the tanning which give rise to the different way in which brown dyes reflect light from the finished leather. Hence, the regional differences in the colours of tanned covers.

The final and vital part of the tanning process occurs in the layaway pits. After the skins had passed through the handling pits to an eveness of colour and saturation, possibly after as long as a few months, the skins were transferred to the layaway pit in which a layer of skin was alternated with a layer of oak bark until the pit was filled. The pit was then flooded with cold water and the leather was left for about a year, enabling a full 10% concentration of oak bark tannage to be reached. The fully tanned

In private conversation, Nicholas Pickwoad has also mentioned to me that this phenomena is apparent in the sixteenth century.

The criticism of long vegetable tannage is not supported by the vast wealth of evidence provided by the survival of those excellently tanned early leathers which have lasted centuries, especially when they are
leather was removed from the pit, rinsed and smoothed off with a two-handled setting pin, which had a blunt triangular cross-section (Cherry 1991 p.297). The leather was finally dried in its own time in natural atmospheric conditions in a barn fitted with louvered panels providing free and thorough ventilation thereby excluding any possibility of mould infestation.

As with paper, wood and other materials, tanned leather could be shipped with ease from one part of the world to another. However, it does seem that in the fifteenth century, at least, leather was produced, purchased and used locally. We know from archaeological and archival evidence that most towns and all cities had tanneries. The surname Tanner was a common one in medieval times, and this suggests that even a village had at least one tanner or leather worker within its boundaries. If there was good grazing in an area, a river and an abundance of good oak trees the requirements for tanning were all present. England was well suited to fulfil these requirements in many locations. It is recorded that in late sixteenth century London there were some 200 tanners at work. (BL Lansdowne MS. 74, f.154). The activity was both an urban and a rural one. It was also a monastic activity as evidenced by the pits at Rievaulx and Battle Abbey. The fact that leather workers were so common in the mid to late medieval period suggests that the supply of leather and its use in so many products of clothing (shoes, waterproofs, leggings, heavy gloves, saddles and so on) determined that supplies in England were adequate. It seems that the evidence of colour differentiation between bindings from Oxford, Cambridge and London indicates that bookbinders sought and obtained leather locally. The thickness of leather of defined colour seems to support the theory about regional differences in production. For example, London leather seems to be generally slightly heavier in weight than that thought to originate in the Cambridge area.

cmpared to modern tanned skins, the durability of which can rarely be asserted beyond thirty years.
Covering materials and parchment - species, quality and preparation

Traditionally, it has been asserted, and it is commonly believed, that books were bound in the skins of a number of animal species. Professor R. Reed describes in detail the differences between the grain patterns of numerous animal species (Reed 1972). Chapter 2 of his book describes the grain/pore characteristics of pig, sheep, goat, calf, ox and camel skins and claims that it is comparatively easy, using this evidence, to distinguish them in new specimens of parchment. Reed's scholarly work is of tremendous value and its importance for the study of historic materials is likely to remain a primary research tool for many years to come; however, whilst Reed was undoubtedly able to identify skins with comparative ease there has been a tendency on the part of historians of the book to perpetuate a long established belief in the widespread use of various other animal skins in bookbinding leathers and tawed skins. The Victorian (and earlier) claims for the widespread use of deerskin seem in part to be based upon a slightly romantic view of history rather than upon genuine histological evidence.

Bernard Middleton asserts the use of sealskin, calf, sheep and deerskin (Middleton 1978 p.118, 285). Edith Diehl refers to the use of chevrotain (or cheveril as it was known in England) made from the skin of the small guinea deer. Diehl also refers to the use of does, lambs and sheep (Diehl 1980 p.66). Eric Burdett mentions the use of sealskin as a historic material, which was undoubtedly used throughout the medieval period in England as well as in other parts of Europe (Burdett 1983 p.367). Sealskin, for example, was noted on a group of Romanesque bookbindings now in the possession of Queens' College, Cambridge. Douglas Cockerell refers to leathers in common use for bookbinding as: goat skin, calf, sheep skin, pigskin and sealskin (Cockerell 1911 p.277)). It is not doubted that a variety of skins were used, but a systematic study of these covering materials has not been undertaken, and it seems likely that the generalised assertions
made in these histories owe more to the popular tradition than to the powers of actual observation.

In order to understand the use of skin for the manufacture of covering materials, it is necessary to consider its use with parchment. The quality of skins used in book production does vary enormously throughout the Middle Ages and earlier. The species of domestic animals from which skin was taken remain much the same for covering materials as for parchment (i.e. calf, sheep and goat). The use of wild animal skins is rather more confusing, and may well assume different proportions for parchment making when compared to the proportions used in the manufacture of whittawed skin. Szirmai suggests that wild animal skins were not used in parchment making on account of the need for greater consistency and the need for an even surface in scribal use (Szirmai 1992 p.170). However, there are objections to this theory. Reed asserts that deerskin, for example, could make excellent parchment (Reed 1972 p.285). 

It is hardly surprising that wild animal skins were far less widely used, because the domesticated pelts were far more readily available and in larger quantities. Deciding the extent to which wild animal skins were

155 The shortage of animal skins for the making of parchment books often led to the use of very inferior pelts, and the patching of skins. Many skins from domesticated livestock were turned into parchment of poor quality. A good example of a calf parchment text-block with numerous parchmentmaker's repairs can be seen at Corpus Christi College, Cambridge, MS. 139 - a thirteenth century copy of Simeon of Durham. This manuscript was made as a working text for other scribes to copy.

Corpus Christi College, Cambridge, MS. 16, Chronica Maiora is another thirteenth century text-block from St. Albans written by Matthew Paris and presented by him to the Convent. It is written on parchment which incorporates so many joins and repairs that one wonders if there was a shortage of materials, or if the monk simply worked in this fashion - pasting patches and joining sheets to bring together his work - almost as a kind of scrapbook.

In the fifteenth century, many text-blocks were composed of very poor and extensively repaired parchment leaves. In the case of working books for
used in making tawed skin is difficult, because distinguishing between reversed, abraded and damaged covering materials is virtually impossible. Distinguishing between calf skin and sheep skin is easier on account of the peculiar ageing properties of sheep skin (see footnote 150). We know that tawyers were accused of using almost any skin that was available, and that wild animal skins were no exception (Thomas 1983). Nevertheless, it is unlikely that wild animal skins were commonly used in the manufacture of tawed skin or of parchment. The survey showed that about 13% of all skin used in the manufacture of parchment, leather and tawed skin may have been made from wild animal pelts. As in the case of parchment, in the fifteenth century (as for other periods) calf skin was the prestige covering material both in tanned and tawed form and was consequently less common. Only 15% of the total number of identifiable covering skins surveyed were calf, whereas 85% were sheep (within a margin of error allowing for the presence of goat and deer which may have accounted for 10% of the 85%). The survey further suggests that overall in the fifteenth century 79% of covering skin was still tawed and 5% tanned. However, in the last quarter of the century the picture changes dramatically with the advent of the printed book. By the end of the century 90% of bookbindings for manuscripts and printed books were covered in tanned calf skin, and only 10% were covered in tawed material.

It is interesting that, in general, the binder was far less concerned about the animal species used as a covering material than was the scribe. Prestige books were written on fine English calf skin parchment, and in the monastic age of book production good quality calf skin or goat skin was school, written by the scholars themselves, they were often of very low grade materials.

156 The fact that tawed sheep skin tends to break down more readily than calf skin is helpful to some extent. The delamination of the grain surface at the coreum layer can occur as the skin deteriorates with age. Calf is less inclined to delaminate, and has a far denser and firmer grain pattern. Where the cover has been applied with the grain side outermost it is far easier to distinguish between species.
usually used in the covering of such books. In the fifteenth century, the bookbinder appears to have taken what was readily to hand, and often covered books of the finest quality in tawed sheep skin. The loss of the chemise originally present on many of these books must be taken into account. It is quite possible that the economical binder could have used tawed sheep for a primary covering and followed with a calf chemise for the secondary covering. It was noted on a large number of volumes in the collection at Gonville and Caius College which retained fragments of a chemise that the secondary covering was of tawed calf skin where the primary cover was of thin tawed sheep skin.

The survey suggests that in the fifteenth century skins used in both primary and secondary covering were by and large of reasonably good quality. Of the tawed bindings examined, only 38% had obvious and marked original blemishes, defects or joins. Even in the case of covering materials for large codices, the skins tended to be of reasonably good quality, any joins being discreet and present as a means of dealing with the physical dimensions rather than as a result of using inferior skins.

There were examples of the economical use of materials by means of joining, and there were examples of the re-use of covering materials but, in general, this did not imply anything more than the frugal and careful disposition of the craftsman. Materials were clearly highly prized by the craftsman and the further they could be made to go the better.

The availability of good skins for tawing and tanning, given the growing numbers of books being bound, leads one to ask how the tawyer or tanner managed to maintain the supply. Judging by the difficulty experienced in the manufacture of good quality tawed skins today, the craft of the fifteenth century worked very effectively. Wire fencing and other farming and slaughtering techniques associated with the modern age may now make it less easy for animal skins to be obtained in perfect condition prior to processing. The prevalence of disease in the early period, the alleged
shortcomings of animal husbandry, the limited availability of really good grazing and of various foodstuffs must act as a balancing argument.\textsuperscript{157}

By 1470, tawed skin and tanned leather rivalled one another as the preferred binding material with 50\% of bindings being covered in tanned and 50\% in tawed. By 1480, tanned calf skin was the covering material identified for 71\% of bindings, whereas tawed sheep skin was used on 27\% of bindings and the remaining 2\% were of tanned sheep skin. By 1490, the survey indicates that 90\% of books were bound in tanned calf skin whereas only 10\% were bound using tawed skin identified as being of sheep origin. Whilst tawed bindings continued to be made into the sixteenth century in England (and in much greater quantities on the Continent), it was never to regain its dominant position as the covering material used in bookbinding. The availability of tanned leather, its better tooling qualities (both in blind and later with gold) and the demands of fashion led to a revival in the use of tanned leather which was to survive in craft bookbinding to the present day, in spite of the known inferior strength and poorer durability of leather. As we have seen, tanned calf skin was made in large quantities and seems to have been selected from good quality skins with few showing blemishes,\textsuperscript{158} and comparatively few (compared to the

\textsuperscript{157} If we accept the argument for the winter cull being a regular part of medieval sheep farming, it could be that many pelts were taken from young animals whose skins had not had time to develop blemishes or the marks of disease.

\textsuperscript{158} It is interesting to note that many early printed bookbindings have been severely damaged with knife cuts running through covers and travelling for several inches in many cases. This damage has always been a source of curiosity - how and why and when did this damage occur? The nature of this damage and the extent and depth of the cuts preclude all possibility that the damage was present at the time the books were originally bound. It seems likely that as the books became familiar and their significance to the owner less important they were used as lap top desks and cutting mats. The artefact was clearly not simply used for reading but became an
figures for tawed skin of the earlier decades) having joins when used as book covering materials.

Where joins are to be found in covering materials, they have, in general, been executed with a good degree of skill and were often achieved with a stab stitch, and the cover was adhered stitch side to the board. Occasionally, it is possible to find examples of scarfed joins meeting on the board face of a blind-tooled stamped binding on tanned calf in which only paste is used to secure the join (Cambridge University Library INC.3.F.2.8, the work of the Lily Binder). Some crude work in re-using covering materials was also seen, where patches of tawed skin were overlaid to make the height of the spine. In one instance these were nailed to the oak boards with small hand cut tacks. (Pembroke MS. 45).

In common with Romanesque bookbindings, the primary covering of the Gothic binding was usually rather thin. Tawed skins were available at the same thickness as tanned skin, e.g. 1 mm to 2 mm. The preparation of the tawed skin was presumably the same as that for tanned leather, and one assumes that this work was undertaken by the currier or possibly by the parchmentmaker in the case of tawed skins. It is of course possible that the tanner worked as currier in addition to carrying out the tanning itself, but the large quantities of leathers and skins required by large urban centres imply that by the late medieval period a division of labour was likely.

The skill and knowledge exercised by the currier deserves some explanation. In general, the quality of tanned skins observed in the survey demonstrates the high degree of sophistication which the allied leather crafts achieved throughout the medieval period. The skins are so remarkably consistent and even in thickness that one must assume

improvised tool. Precisely when this type of damage occurred is impossible to establish, but one can imagine a situation where a historical change in emphasis placed certain texts (or decorative binding features such as those bindings with religious symbolism) in a distinctly unfashionable light but not sufficient to cause actual destruction of the book, and in these
bespoke production suited to particular crafts and purposes was taking place. The currier was responsible for shaving the skin to an appropriate thickness. The work was undoubtedly very hard but at the same time required considerable skill because the potential to damage the leather was always present (Salaman 1986 p.301-311).

circumstances the bindings fell victim to other uses and abuses - perhaps at the time of the Reformation or in the mid-seventeenth century.

Reducing the thickness of the leather occurred at two phases of production. Firstly, it was reduced. This was achieved when the tanner, with the wet skin thrown evenly over the curved tanner's beam, used a sharp two handled fleshing knife to remove loose flesh. He did this by leaning over the beam and pushing the knife away from himself down the length of the skin and beam. The concave side of the fleshing knife lay nearest the work, and as the knife was moved in a slicing action diagonally across the hide the curvature in the beam caused unwanted flesh to be removed. The trailing edge of the fleshing knife, which was not as sharp as the leading edge, was used to lift the hide back into position as it slid away down the beam, and so the tanner's two hands remained at either end of the knife. The knives had to be kept very sharp in order to reduce the laboriousness of the process, and the potential to damage the skin was always present. (This process is not to be confused with the removal of hair from the hairside of the skin which was achieved over the beam at an earlier stage with a blunt scudding knife).

The second and more critical stage of thinning was achieved over a currier's flat beam with the help of a currier's knife. The currier's knife was sharpened like a cabinet makers scraper by turning the burr of the sharpened edge with a steel, thereby making the tool into a scraping instrument rather than a paring one. The skin/leather was dampened, and placed over the flat beam and held in position by the weight of the beamsman leaning against the beam and material. The knife was then pushed with considerable effort in a scraping action down and over the surface of the leather. Full moon knives were also sometimes used in a scraping action as part of the thinning process.
The tanner was responsible for dyeing leather (although in some of the surveyed bindings it was clear that additional staining of both tawed skins and leather took place after some books had been covered) and he was responsible for staking the leather to make it supple, and for polishing and finishing it. The finishing of the leather with dyes and the staking and polishing (with sleekers of metal or stone) would have provided the late medieval binder with the evenness of thickness and the rich polished colour obvious in so many of the late fifteenth century tanned calf skin bindings with or without blind tooling (Salaman 1986 p.313). The practices of the medieval currier are sometimes evident on the reverse sides of book covers as with the use of the currier's knife noted during the conservation of Corpus Christi College, Cambridge EPE.10, dated 1480 by an Oxford binder imitating Romanesque tooling. The fact that the eighteenth and nineteenth century tools of the currier were much the same as those of the medieval period is shown by archaeological finds, for example those found in Norwich (Margeson 1993 p.189-191).

Primary Covering Technique

Most fifteenth century books being covered for the first time were given a full covering in either tawed skin or leather. The uniformity of the thin leather or skin meant that additional paring of the overall surface was most likely unnecessary, and therefore in the surveyed books the suggestion that paring was overall (e.g. thinning of the entire surface, usually flesh side) relates to the work of the currier rather than to that of the binder. The binder rarely needed to pay special attention to the turn-ins because the skin or leather was thin enough to allow him to cover around the board edges and on to the inner face without significant edge paring. This fact can be proven with complete certainty when an examination of the turn-ins on a reversed skin cover are available for
examination\textsuperscript{160}. In numerous examples the presence of the grain surface on the board side of the turn-ins suggested that the skin had not been pared or thinned by the bookbinder. The fact that angled knife cuts were noted on a number of turn-ins, where there had been an attempt at the rough trim out of the turn-ins, sometimes helped to establish that the subject was undisturbed by later repair work, especially where the contemporary staining of the cover had affected the bare edge of the turn-in left by the trimming out. An examination of other parts of the cover can sometimes establish that the colour had been added at the time of binding (i.e. colour seen under secondary endband formations).

Covers were cut out in one of two ways - with knife or shears/scissors\textsuperscript{161}. The primary cover was usually pasted all over - with the exception of the spine area which was sometimes masked out in the case of certain tawed skin bindings on parchment text-blocks (an apparent survival of earlier medieval bookbinding practices). In the second half of the fifteenth century there was a dramatic increase in the practice of tying-up the covers on books, indicating that the spine of the book was pasted with the intention of sticking the spine to the back of the book. The majority of incunabula bindings examined were tied up. Tying up was usually found either side of the band and in the middle of the band, and about three or four times in the area corresponding to a location behind the caps (this applies to books with no true caps as well as to those sewn-over, plaited or where covered endbands exist) in a solid block. In the case of the London binder, known as the Scales Binder, the habit of tying up at intervals of

\textsuperscript{160} Such attention to detail in surveying is only possible in circumstances where the book is the subject of conservation work and should not be attempted by the lay person. Any interference with original materials is likely to disturb the original condition of the object.

\textsuperscript{161} Large numbers of covers were cut from a skin of leather using shears of a type which stretches back through history to the pre-Christian era and which is still being manufactured today. Scissors with a central pivot were also available to the medieval craftsman but were comparatively rare until
about 10 mm along the entire length of the spine must in part
demonstrate a desire to get good adhesion between cover and spine in
addition to his intention to use the tying up as a decorative feature.
(Photograph 43 - Trinity College, Cambridge, 0.3.14).

The corners observed in the survey were of the following three types, the
commonest being the tongue corner (Diagrams - Corners 1, 2 and 3).

1. The use of mitre corners and of lap corners is not unknown in the
fifteenth century but these latter corners are more characteristic of later
periods. In a few books, a combination of different cornering techniques
incorporating various adaptations of the types listed were found. The
mitre corner is characterised by a single vertical knife cut with the
leather tending to butt on the corner itself (angling the mitring seems
to be a subtlety which was introduced at a later date).

2. The lap corner was seen on a very small number of examples, and is
associated with very thin covers (in one case Pembroke MS. 258
Narrationes - an amateur binding by a priest who has improvised a
cover with lap corners, utilising a parchment cover over boards pasted
from cut up paper Statutes of Edward IV)\(^{162}\). In the making of fifteenth
century lap corners very little attention was paid to which turn-in
passed over which: e.g. fore-edge over head and tail (as is now
considered conventional) or head and tail over fore-edge.

\(^{162}\) This binding amounts to no more than a semi-limp structure. The
sewing seems complex because it is effectively improvised by somebody
who has no knowledge of binding, in order to deal with the various
quires. It consists of an unsupported structure, with a series of knots to
secure ends of thread which rely heavily on the parchment cover.
Subsequent to the original binding, damage has occurred as a result
scholars wishing to gain access to the Edward IV Statutes, which constitute
the pasted semi-limp boards. The damage obscures what was once a
straightforward continuous primary sewing attaching the cover to the text-
block.
3. The tongue corner has a long history and can be found on bindings of the twelfth century through to the seventeenth and beyond. It is characterised by double knife cuts which can often be seen on wooden boards, and these cuts provide clear evidence that this was the type of corner, even where damage has removed the corner itself. The corner is observed throughout the fifteenth century and was automatically chosen as the preferred corner for bindings of the tanned calf variety which were never intended to be given a secondary covering.

It was not uncommon for corners of all types to be mixed on the same binding in combinations, never more than two at a time.

Throughout the fifteenth century the statistics indicate that the tongue corner was used in 85% of stiff board bookbindings. The mitre corner was used in about 10% of bindings, and the lap corner in 3% of bindings and a combination was used in 2%. The survey indicates how conservative the binders were in the techniques used, with very little deviation from the norm.

In dealing with the cap area of the bookbinding (i.e. the area at the head and tail of the spine where the covering material is unattached at the point of covering, and which in the modern tradition is usually turned-in upon itself and adhered to the spine with paste), the fifteenth century binder used one of three techniques - sewn over, covered and turned-in. The most common approach in the family of sewn over caps was to cut the covering material parallel with, but beyond the line of, the board edge. The cut skin at the spine (which was usually pared extra thin at this point) was trapped in the secondary sewing of the endband, normally adjacent to an area just in front of the spine edge (and under crowning core 3 in a triple arrangement when counting cores from the spine(crowning core 1) to the extreme head (crowning core 2) fore-edge side (crowning core 3), (Diagram - Endbands 6). The second and also very common treatment of the cap area involved trapping the cover within the secondary plaiting of an endband. (See descriptions for secondary endband sewings above). Another method of dealing with the covering material at this point involved its use as an
endband cover, supported with simple secondary sewing which passed from board to board under the endband and passing backwards and forwards from spine side to fore-edge side (see covered endbands above). What has become the final solution to the problem of the cap area was achieved by the standard modern approach, whereby the leather is turned in upon itself in the presence of headbands rather than endbands, and, with the leather turned in upon itself, adhesive is applied to the grain side as well as the flesh side of the cap turn-in which is then tied up and stuck to the spine itself.

**bindings with a chemise**

All bindings incorporating a chemise secondary covering were of tawed skin (both primary and secondary coverings), though some included a circuit piping of tanned leather at the periphery of the chemise skirt.

In common with the Jesus Prayer Book (Q.G.30 mentioned previously), in many examples observed the primary covering had the suede side outermost with the hair-side to the board. The secondary covering or chemise had the suede side innermost and the hair-side outermost. It seems that this arrangement of suede to suede may have had something to do with the handling characteristics of skin, by helping the chemise to cling to and support the thin primary covering, it also helped to improve the opening characteristics. It is noteworthy that many books of the period which have lost their chemise often have a primary cover in a reverse skin, and this possibly explains the preference. It seems unlikely that it was reversed to conceal scarred or poor quality skin when situated under a chemise and out of sight. In all of the examples observed no evidence was found of split skins\(^{163}\), and whilst it is well known that this was possible, it

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\(^{163}\) Splitting occurs where the skin is swelled with water and split through the centre prior to tawing to provide from one skin two areas of material only one of which would, of course, have had a hair surface.
does not seem to have been used in English bindings of the period although this has been asserted in the past.\textsuperscript{164}

The chemise of fifteenth century books often incorporated a skirt which simply met at the centre of all edges and did not always extend at the fore-edge to form a wide, enveloping flap. In these cases, the closure of the book was often achieved by means of fore-edge clasps which closed on to surface or edge-mounted catch plates. When the book was clasped shut, the two edges of the chemise touched at the centre of the book's edges and so excluded dust and dirt whilst simultaneously providing the text-block with some additional protection from sudden atmospheric changes. This was not always the case, and as can be seen in Peterhouse MS 12, the fore-edge flap does extend across the lower board face, being held fast by bands, clasps and side-pins. Magdalen College, Oxford, MS.39, has lost its chemise, but it is clear that this binding was also fitted with a chemise which incorporated a wide fore-edge flap. It seems that the use of the wide fore-edge flap design of chemise was, in the fifteenth century, associated to some extent with larger format bindings. Of course, there were also books with special functions, such as girdle books which incorporated a long skirt, and there were still books that were not girdle books but had a long tail skirt suggesting a carrying function. In all likelihood Magdalen College, Oxford, MS.39 was such a book. However, the habit of providing the long tail skirt was not as universal as it had once been, and more books appeared with a less extensive chemise, such as that seen in Jesus College, Cambridge, MS. Q.A.13, and British Library BM.Add.22,285, (Diagram - Typical fifteenth century chemise bookbinding). So few manuscripts survive with intact chemises that the Jesus College book provides a rare

\textsuperscript{164} These assertions are usually to be found in Victorian definitions of the term "forell", which is one of the most commonly misunderstood of terms with numerous possible definitions. The most convincing definition concerns low grade parchment, but it is often confused with poor quality tawed skin (Power 1870 p.102).
opportunity to examine an intact and untouched contemporary binding with chemise of the middle fifteenth century.

The construction fifteenth century chemise bindings

In Chapter 2 a very brief constructional description of the chemise was outlined. It is necessary to provide a more detailed description of the construction of surviving chemises on fifteenth century bindings in order to understand the complexity of the structure.

The chemise usually had separate envelope flaps which were sewn to the main part of the chemise cover. The flaps were normally of a much softer and thinner skin than the heavier main cover of the chemise itself. In the case of Jesus MS. Q. A.13 (Photograph 44a-j), the main part of the chemise is considerably heavier than the flap. This binding is particularly interesting because through the small hole in the chemise it is possible to see that the primary cover has not been tied up, whereas it is clear that the chemise has been tied up either side of the band. The chemise is typical of the late medieval period, with the fore-edge clasps passing through a narrow slit in the envelope flap at the edge of the board. The chemise is very secure and there can be little doubt that the flap was damped slightly before being stretched on to and over the primary cover.

The chemise binding in the collection of the British Library - MS. Add. 22,285 (680.B.1) Martyrology of Syon Monastery - is remarkably similar in certain details to that of Jesus College, Cambridge. However, it is interesting to note the differences between the two bindings. The Jesus College binding has beech boards whereas the BL manuscript has the more typical oak boards. The main similarities involve the design of the chemises, and the way in which they meet exactly at the centre of the fore-edge.

Colours of bindings

It is interesting to note that alum tawed skin was frequently stained with organic dyes, most of which have now faded and discoloured. It is
important to state that the colour was applied to the surface of the skin (possibly with a brush) as a stain and the skin was not dyed by immersion of the material in a dyestuff. However, examination of small areas about the inner board face at the edge of pastedowns frequently affords an opportunity to recognise original colour and vibrancy of shade. It is not uncommon to find a primary cover of one colour and a secondary chemise of another colour on the same book. Surprisingly, one occasionally finds examples where the primary cover of a binding has been stained red but the chemise is white. This seems completely pointless because the expensive red staining (often done with the rare dye of the kermes beetle and imported at considerable cost) cannot be seen under the chemise. The only logical explanation for this phenomenon is that the skins were bought at an appropriate weight for the primary covering and were stained red before they reached the bookbinder’s workshop. (See Pembroke MS. 32, binding from Bury St. Edmunds, Photograph 45a-b).

The use of red dyestuff for colouring skin is well documented and numerous recipes exist.\footnote{The Plictho of Gioanventura Rosetti, Venice, 1548 is but one of many hundreds of sources for early dyeing and staining recipes. It is particularly useful in that it lists so many recipes relevant to the dyeing of textiles and leather. It is also helpful in describing the great variety of alternative dyes used in the sixteenth century, demonstrating clearly that it is very dangerous to assert that simply because a skin is red it must have been dyed with kermes. Madder, brazil wood, and even corruption of dyes involving the use of iron oxide, were all used as alternative means of achieving a red stain. The Plictho may well be easier to consult than the much larger and more standard work, drawn together from a number of manuscripts dating from the twelfth to the seventeenth centuries, by Mrs. Mary P. Merrifield in the nineteenth century Original treatises on the Arts of Painting, for the former is more specifically concerned with dyeing than with painting) (Rosetti 1969) (Merrifield 1967).} It is undoubtedly true that many of the very rich crimsons must have been achieved with kermes, for it is not possible to imagine a substitute dye that could achieve the intensity and depth of colour found on some of the bindings. But the rather pale orange colours...
also seen suggest that alternative dyes may have been in use, especially because they are not always on the outer board face where the colour might have been burnt out, but are sometimes observable on the protected turn-ins and under pastedowns.

Alum tawed skin could easily be stained blue with a dye based upon woad, and also be stained green with a dye based on a sap green extracted from buckthorn, Rhamus Cathartica. Of course, there were many alternative means of staining skins blue and green, and these ingredients were undoubtedly in common use. Experiments undertaken in Cambridge with these dyestuffs demonstrate how effectively the skin can be dyed.

The survey of books suggested that the overall majority of books bound in tawed skin were not coloured at all, but it also showed that where colour was involved significant numbers throughout the century were stained but not dyed. In the first quarter of the century the primary covers of 25% of the sample were stained red, the remainder recorded in the survey were white. In 1450 the sample indicates that books were coloured as follows:

- 55% White
- 33% Red
- 4% Green
- 8% Brown (i.e. tanned leather)

These figures are undoubtedly misleading in that this is a snapshot taken of a group of 300 books sufficient numbers to be truly representative. However, it does demonstrate the variety of colours used in otherwise plain bookbindings, and begins to suggest what a collection of fifteenth century books may have looked like. Indeed, the total absence of blue (see footnote 39 on woad), yellow and the few examples of green covers are most likely due to the loss of large numbers of early bindings.

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166 Staining is merely the application of pigment to the surface, often after covering. Dyeing involves the immersion and complete penetration of colour through the skin.
No examples of a coloured chemise were found in the surveyed books, although one book recently observed, known as the Red Book of Bath and in the ownership of Longleat House, did show some evidence of having once had a reversed red chemise. This binding dates from the fifteenth century, although the manuscript within is earlier. It is, sadly, the limited number of surviving chemise bindings which accounts for the failure of the survey to provide evidence of such features.

Clasps and metal fittings

It is very difficult to find a representative sample of metal book fittings for any period of time or location. Book fittings have been discarded and lost in such large numbers that, of the surviving examples of intact original bindings from the medieval period, only a small percentage retain their metal clasps, bosses, corners, plates, catchplates, side pins, chains, chaining staples and so on. Most books show trace evidence of having had some of these features, a few retain one or two actual fittings, but very few indeed still retain all or most of the fittings.

In order to get a picture of metal book fittings for the fifteenth century in England, it is necessary to supplement the sample with archaeological examples as well as examining examples from actual books. The three hundred books described in the thesis were examined for evidence of there having had metal fittings and such traces of evidence were recorded, in addition to the recording of those books with metal fittings still in place. The archaeological finds added to the survey of the three hundred books numbered more than one hundred artefacts.

The main survey focused upon the collections in Cambridge which to some extent have a known provenance. It is therefore possible to say that some of the metalwork found on the books reflects the local practices of major cities or monastic centres. For example, the bulk of the manuscripts in the Pembroke College collection have a straightforward provenance to the Abbey at Bury St. Edmunds. Proving whether or not the metal fittings were manufactured in Bury or were simply imported to the town is
virtually impossible. We do however know that at Durham, towards the end of the fifteenth century, a large number of clasps were bought from the Low Countries as part of the refurbishment work in the cathedral library\textsuperscript{167}. Much of the collection at Gonville and Caius College has a secular focus and a provenance closely associated with the college and its scholars, and therefore it seems highly likely that many of these books were bound in Cambridge, and as a consequence much of the metalwork possibly came from Cambridge. Not all of the college collections are so clearly defined in terms of their provenance.

Decorative tooling helps us to understand which bookbinders were using which fittings. We know that the Scales Binder, for example, was undoubtedly a London binder, and he seems to have been fairly consistent in his purchase of fittings.

The introduction of archaeological and other incidental finds into the data is problematic, because in some measure one has to rely upon comparative examination and upon a knowledge of medieval metalwork to decide date and location of manufacture. However, the archaeological examples do highlight the diversity of fittings in use, and thereby enrich the picture and our understanding. In fact, most of the archaeological finds have been retrieved from the River Thames over the last thirty years. It is possible that these clasps were made by London metalworkers but they could also have been imported. The tidal action of the River Thames and the fact that objects such as odd book fittings were probably originally discarded as waste tend to be complicating factors in asserting anything about the provenance of the objects.

Metal fittings on books in the fifteenth century can be listed as follows

1. Clasps operating from board edge to edge, catching on a catchplate.

\textsuperscript{167} I was informed of the fact by Professor A. I. Doyle, who had read about the purchase in one of the cathedral archives.
2. Strap and side pin catch which operated from upper board edge to lower board centre. (Associated with the presence of a chemise type binding, in which a fore-edge strap emerges through the seam of the upper envelope pocket of the chemise).

3. Bosses - cast or formed.

4. Edge strip of copper alloy which was generally nailed or riveted to the edges of the book.

5. Corner of copper alloy fixed over the edges at the corner - sometimes as a shoe on the very edge of the board and sometimes extending over the corner of the board in a three dimensional triangular form (the latter are probably not English).

6. Chains - fixed to the edges or centres of boards by means of a chaining staple, and always incorporating a swivel fitting approximately 9 to 12 inches from the chaining staple along the chain.

Features of this type are lost for a variety of reasons, and often as part of a sequence of events. The metal fittings which appear to have been discarded first were probably those directly affected by the presence of a chemise. With the adoption of vertical shelving in England towards the end of the sixteenth century, the chemise was often discarded and with it bosses and metal fittings which passed over or were fitted through the cover seem also to have been discarded in large numbers.

The fashion for chaining books seems to have lost favour in the seventeenth century and some archives have records of the sale of lengths of chain from their colleges (notably at Trinity Hall and Gonville and Caius). The wholesale removal of chains seems to have been effectively complete in Cambridge by the beginning of the eighteenth century with one exception - Gonville and Caius retained chaining longer than the other colleges. Straps and catches are the second most likely metal fittings to survive, but it is surprising how few of them actually remain in situ. The fact that tanned leather was sometimes used for the strap material can
hardly have helped, and as the leather degraded so straps broke and the clasps were lost. Catchplates have tended to survive in larger numbers than any other metal fittings. However, many of these have been removed when repair work to the cover was undertaken. The remaining evidence of metal fittings is to be found as trace evidence, when the fitting has left a shadow of itself on the leather or where the riveting holes appear with staining (sometimes a helpful green copper colour) on the pastedowns. The laying-down of new pastedowns and ends and the over-repairing of leather covers has effectively removed a further layer of useful evidence in many cases.

Fore-edge strap to side pin

This type of fastening arrangement is associated with the chemise bindings of the monastic tradition. It can be seen in the twelfth century and before, and is clearly in the main stream tradition of book making. The strap is usually recessed into the upper board, exits through the primary cover via a neat slit, and is usually fixed with three or more cut copper alloy nails. It then passes through a narrow slit in the envelope flap just beneath the line of the seam which attaches the envelope flap of the chemise to the heavier covering material of the chemise itself. The strap is terminated with a metal fitting which can be designed in one of four ways.

1. A hole is made through the strap which is then supported on either side of the strap by matching metal catchplates. This means that the strap can continue beyond the pinning point and thereby provides a flexible pull by which the catching can be operated with ease. A rather heavily constructed version of this type of catching to a catchpin can be seen in fifteenth century work on a binding at Peterhouse MS. 13 (Photograph 46 and Diagram - Catches and Catchplates 4).

2. Another type of catching to a catchpin is achieved when the metal is folded over the end of the strap. In this case the fold encloses the core end of a tassel for pulling. A typical example of this type of
catching system in fifteenth century work can be seen in the Pembroke College Collection (Pembroke MS.253) (Diagram - Catches and Catchplates 5 from working notes).

3. A catchplate for a pin can be in a decorative form in which the catch is hinged and often terminates in an animal head through the mouth of which is passed a tassel, three late medieval examples of which can be seen in Photograph 47).

4. A combination of the first and the third type, where the metal catchplate is in two parts, riveted together through the end of the strap. The fact that the catch ends in an animal head intended to incorporate a tassel indicates that this two part catch is a variant form of the previous two. The only example observed is from a private collection of metal artefacts and its date is uncertain, though the decoration indicates a later medieval style (Diagram - Catches and Catchplates 6 from working notes).

Catchpins

The catchpins were designed in one of two ways. A number are straightforward copper alloy cylindrical nails with a sharp point, and are hammered into the board face through the coverings. There are a large number of surmounted catchpins in which the nail has a square skirt of copper alloy plate half way down the pin which is sometimes lightly decorated with engraved lines. In the case of the surmounted catchpin, the artefact is made in two pieces and is never cast as a single object. It is usually arranged on the board as a lozenge to the vertical head/tail axis of the binding.

Clasp type from board edge to edge

This type of clasp seems to be associated with the latter half of the fifteenth century, and in large measure seems to have superseded the side pin and strap/catch arrangement. A few book boards exist which suggest that there may have been some books with both a side pin and catch arrangement
and an edge to edge clasping arrangement. It is impossible to say with certainty if this did or did not occur, because all the examples of this type in the survey are damaged and no longer retain the actual clasps - it is only the recesses and remnants of cut copper alloy nails which tell us that there was once a strap/catch and side pin and an edge to edge clasping mechanism. It is also highly likely that a new style of catch was added to the book after the side pin catch arrangement had been broken, lost or removed. It is also possible that some bindings existed in which the binding was closed with edge to edge catching, and a chemise with a wide fore-edge flap was closed on top with strap and side pin - although to my knowledge these have never been noted.

The board edge to edge clasp is always made of a copper alloy and was made by one of several different methods. Some examples appear to be cut from a piece of copper alloy which was then filed into shape. There is sometimes an effort to decorate such clasps with the help of file, punch and drill work (Photograph 48, Diagram - Catches and Catchplates 1 and Diagram - Typical late fifteenth century blind stamped tanned calf binding).

Book clasps of this sort were comparatively common, and this type of mechanism lasted well into the sixteenth century. It is a design associated with the age of the printed book, and by the end of the fifteenth century it had evolved into a stereotypical design with a very wide recessed lacing channel for what was normally a tanned calf strap. The calf straps were almost always recessed and were fitted under the covering material, passing neatly through the cover at the edge of the board. Frequently the straps were fixed with cut copper alloy nails and many had the addition of a thin copper alloy plate to hold the strap in position. The plates could be quite sophisticated shield shapes with softened filed edges, or they could be straightforward rectangles cut from 1 mm copper alloy plate. The width of the clasp where the strap emerged from the board seems to be a decorative feature in one sense, but it may also have been determined by the need to establish a really strong link between the book and the hinging action of
the clasp. In any event, because tanned calf skin was used the straps have frequently broken and few examples survive intact.

It is possible that the late fifteenth century wide type clasp was a development of the narrower form of clasp which also fastened on to a catchplate on the lower board. These slightly earlier fifteenth century clasps are associated with manuscripts rather than printed books, but they have a rather longer leading strap, and this is often of tawed material rather than leather. The straps emerge from a recess on the upper board and the smaller clasp, with the same hook type action is fixed to the end of the strap. These edge to edge clasps appear to be comparatively common in books of the fifteenth century where a late type of chemise has evolved. The long strap and side pin arrangement was superseded by this type of clasp, and a few examples with the chemise still present exist. It is also clear from an examination of the Pembroke Collection that books which clearly did have a chemise also had clasps of this type. It is a simple way of clasping the book and serves to bring together narrower envelope flaps which meet on the edges of the book once the binding has been closed and clasped (Photograph 49 Jesus College Q. A. 13).

There is a good deal of variation in the details of decorative design found on similar clasps. Many of the decorative features of the later and more common edge to edge type clasps can be seen on the earlier form. It seems highly likely that these metal fittings, like all others, are made to order, by a craftsman who is making metal fittings for many purposes. In the case of the poorer quality cast clasps, it is possible that they were made on the bench with the medieval equivalent of bunsen burner technology, i.e. a small crucible, in which to melt the alloy, and open cast moulds. This was almost certainly the way in which the clothiers made the clothes fastenings, and it seems probable that they manufactured these themselves. Such cheap items, with one face decoration, are of poorer grade metal and superficially appear to have a high lead content (giving rise to a slightly ragged surface appearance). In order to establish the true
lead content of any copper alloy a proper metallurgical analysis would be necessary (Blair 1991 pp.81-106).

It is virtually impossible to establish to what extent specialist clasps were made for particular types of books. However, some examples of specialist work can still be found. The clasp with an angel cut into the surface, with the background in relief, must surely have been for a devotional book of some sort or another.

Catchplates to edge to edge clasps

The catchplates used in edge to edge clasping are of several types. The earlier form, and a very common type found in manuscript work, is that which is fitted into the edge of the board. Catchplates were usually manufactured in one of two ways. The earlier form, which overlaps with the later, involved the cutting of a triangular shaped piece of copper alloy normally about 1 to 1.5 mm thick. The metal was drilled to open the slot for the catch of the clasp, and this was then filed to open out a flat area.

Prior to covering the book, a knife slit is made into the edge of the board, usually before the shaping of the board has taken place. This is obvious, because passing a knife into an already shaped board tends to cause splitting and is associated with poorer quality work. The catchplate, which is usually made in one of two standard ways, is then gently tapped in position into the slit. In some cases, a nail is passed into the face of the board to lock the catchplate in position. This is sometimes done prior to covering thereby revealing that the catchplate was fitted prior to covering. Sometimes the nail was put into the board after covering. Sometimes no nail was used whatsoever, and the catchplate is so tightly wedged in the slit that it does not move.

The second basic type of catchplate was manufactured from two pieces of metal. A thin (1 mm) piece of copper alloy was cut to form a basically rectangular shape with a pointed tail at one end. Into the square end, two fine saw cuts were made and a slot was opened up; the remaining metal flanges on either side of the slot were then wrapped around a piece of thin
(average 1.5 mm) iron rod. This two-piece catchplate was later developed and refined for work on early printed books. In the case of the later period, the metal work echoed the decorative features of the clasps and was designed to be placed and riveted to the surface of the lower boards - rather than being driven into the edge.

By the end of the fifteenth century, with books almost always having a decorated primary covering in tanned calf skin, the decorative copper alloy surface-mounted catchplate had overtaken edge mounted plates and came to dominate the scene. As the craft of bookbinding evolved, so did the work of the allied trades, such as the metalwork for the making of the clasps and catches.

**Bosses**

Bosses (Private Collection, Photographs 50 a-f) were used less frequently towards the end of the medieval period, although there is considerable evidence to suggest that their use was still widespread in the larger bookbindings. A few early printed books in the survey of three hundred books also exhibited evidence of bosses, and one in a private collection still retained the bosses in situ (N. J. Barker / Fishtail Binder). In the case of the bosses on the binding by the Fishtail Binder, it is difficult to establish the technique of manufacture, but it seems that they are very large headed nails which have been tapped into the board-face as part of the final finish. It is possible that these bosses have been added some time after the bookbinding was completed, but there seems no logical reason why this should be, especially as the case for bosses was already fading by the time the book was originally bound.

All bosses of the fifteenth century look as if they are made from copper alloy, and the method of manufacture seems to have varied according to size and aesthetic design. Some bosses were shaped over a form of solid iron, as with the Fishtail Binder's bosses mentioned above. A piece or strip of copper alloy plate about 0.5 mm thick was simply beaten over the form until a dome was created. It is interesting to note that on the outer rim or
periphery of some of these bosses the metal has split to accommodate the stretching action of the technique. The boss shank was then generously lead-filled within the basin face of the dome. In the case of a larger boss, the amount of lead used to fix the hollow shank could significantly strengthen the boss itself and it is rare to see bosses of this sort with any dents, presumably for this reason. Some bosses were made with a fluted shape, which was another way of providing decoration whilst simultaneously providing a much stronger and more rigid structure. In these cases, it is placed over a male and female type of former was employed, in which a strip of copper alloy was wrapped around the male form and the female reflecting shape was then hammered over it to produce the fluted boss. The seam on the inner face of some bosses is quite evident, sometimes demonstrating that these were not cast.

Some bosses were undoubtedly cast, again with the use of copper alloy, and as with other metal fittings there was an overlap between the use of metal fittings for one trade and another. Some small metal items used in the decoration and protection of horse harnesses bore a remarkable resemblance to book bosses, and presumably there could have been an overlap in the manufacture of the functioning parts of harness and book furniture when made by the blacksmith. In the case of the horse harness metal work, the metal flanges on the inner face were used to fix the copper alloy boss to the leather strap work. It is usually difficult to establish the method of manufacture without removing a boss from its fixed position.

Edge Strip

The edges of some book boards were protected with a continuous strip of copper alloy tacked all the way around the very edge of the board with copper alloy nails. This strange form of protection seems to be associated with the Germanic world and affects English Bindings only in so far as it was introduced by émigré binders. The strip is generally cut from 0.5 mm copper alloy sheet, possibly with some form of snips. Very few bindings exist with the strip still in place, but there are a number with holes and traces suggesting that edging has been used. The edge strip itself is very
rarely to be seen but, when available, it is clear that it is light weight and must have been difficult to fix securely to the edge of the board with a single line of nails.

Corners

A number of books showing continental bookbinding influence also had metal corners. That is to say, they were fitted with a corner of copper alloy on the edge of the board. This is really a shortened form of edging, fixed usually with four nails. Such corners are common on the work of the Lily Binder, whose work also exhibits other Germanic characteristics. Corners of this type are usually of heavier construction (i.e. 1 mm to 1.5 mm thickness) than the edging previously mentioned.

The triangular form of metal corner was not observed on English fifteenth century work, and it seems most likely that these were not used before the sixteenth century in England.

Chains

Very few books survive with the chain still attached (Diagram - Chaining, Diagram - Anvil and Photograph 51a-c of Mellish Psalter Chain, Nottingham University Library, 69), though many exist with the evidence of a chain once having been present. The examples which were discovered in the survey were important because an opportunity was provided to study closely the method of manufacture. (Nottingham University Library - Mellish Psalter). The loops of iron are made with a scarfing weld, and the blacksmith has calculated with a fair degree of accuracy the amount of metal required, because there is little evidence of upsetting, although there is a hint of thickening about the U-turn of the links. The scarfs have been drawn out cornerwise on the edge of the anvil table. The loops appear to have been formed on the face of the anvil rather than on the bick, although the welds themselves have been worked up on the bick with the welds being slightly larger than the original diameter of the metal. This is typical fifteenth century blacksmith's work of average to good quality, but
in terms of the expertise required it was probably a rather humble task. The chain is made from 4 mm square section iron.

The iron used in the case of the Mellish Psalter chain is not of particularly good quality, and this is not surprising because at this date there was often as much as 10% slag impurities in the iron provided for general use. The characteristic lines which appear in the body of the metal chains are most likely the result of impurities in the metal and may be associated with a high arsenic content.

The method of attaching the chain to the book is of particular interest, because the chaining staples varied from one library to another. The Bury St. Edmund's Priory chaining, for example, can be used to identify Bury books because it is rather unusual. In this case, the staple was riveted to the lower board face just a little north of the centre of the board.

The position of the chaining staple can be a great help in establishing something of the provenance of a book even after the chain is lost. The fact that one sees four large rivet holes on the lower pastedown of a manuscript tends to start one thinking in terms of a Bury book when looking at the Pembroke collection. The position of the chaining staple in many of the college libraries in Cambridge varies enormously - head to tail, upper to lower board and so on. In the case of many college chains a simple staple, rather like an open chain link, was fitted on either side of the board, it had spoon shaped ends through which a rivet was passed thereby attaching the chain to the board. The chains and staple were made of iron, although many of the chaining marks have a copper stain about them suggesting the use of a softer copper alloy rivet.

The college chaining was often later than the original date of the book, but the monastic chains on manuscripts from monastic collections are usually contemporary with the making of the book. Distinguishing between later chaining and original can be difficult, and in most cases reference has to be made to the histories of the libraries involved.
How were they made and who made them?

Artefacts in this section are from a Private Collection, Photographs 52 a-c.

There is much confusion over the terminology used to describe those working with copper alloys in the medieval period. At one stage they were commonly known as potters on account of their manufacture of copper alloy pots, but this term effectively ends by the middle of the fourteenth century (except in York). Brasier is another term used in the Middle Ages, but this is frequently confused with brewing. Nevertheless, it is clear that brasiers were producing small portable objects in copper alloy. Lattener, another term used, really has its origin in a refinement of the copper alloy used (i.e. latten was a refined grade of copper alloy with the deliberate inclusion of zinc). Latteners also made small copper alloy objects including seals, dishes, pots and so on. It is also possible that small scale objects were cast by craftsmen from different trades requiring small copper alloy objects for their own trade.

Most book clasps, catches and other metal fittings are made from a copper alloy, which in colour and hardness seems to match well to the alloy which we today commonly refer to as brass. However, the colour of the metal used is the most unreliable of criteria, and it is impossible to establish the true nature of an alloy without proper metallurgical analysis. The commonly accepted modern terms of brass as an alloy mainly of copper and zinc, and of bronze as an alloy of copper and tin, are useful. However, in the absence of metallurgical analysis, they are not used by archaeologists because of the looseness of their meaning, in scientific terms.

Theophilus "On Divers Arts", c.1122, describes the making of brass and distinguishes it from bronze and other copper alloys (Theophilus 1979 p.149-159). The fact that most of the book clasps show little evidence of gilding (although this is not entirely true) indicates that the metal of which they are made is in general true brass rather than some other alloy. That is to say - it is an alloy of copper and zinc as opposed to an alloy of
copper and tin. There is much confusion about the medieval processes and a succession of translators have mistakenly added to the confusion by simply regarding the ability to accept gilding as a benchmark for distinguishing bronze from brass (which it is not). In the case of the book clasps observed it would appear that there is a marked difference in the copper content, and an equal variation in the degree of hardness of the metal. The metal is probably therefore coarse brass with varying amounts of impurities most of which are probably lead. Theophilus also records that casting in copper alloys was commonplace in the twelfth century, and Professor Tylecote confirms that casting in brass in small quantities was widespread in the medieval period (Tylecote 1992 p.84, 151).

Crucibles for the purpose of casting small amounts of copper alloys have been found throughout Europe from the earliest times (i.e. Bronze Age onwards). A sample of some small crucibles of the medieval period in Britain have been excavated from sites in Winchester (12th century), Wadsley near Sheffield (medieval) and the River Nene near Northampton (not stratified). The crucibles all vary slightly in design according to their place of manufacture and date, but it is quite clear that casting copper alloys did not present a major problem to the fifteenth century craftsman and sufficient heat could readily be generated for the purpose in an open hearth with a pair of bellows. There is much evidence of copper mining in the medieval period in Devon and Cornwall, Cumberland and Yorkshire. There is also evidence of impurities in copper used in the manufacture of goods, in particular that from the West country may well have contained large quantities of antimony.

To produce better quality copper alloys, calamine was required which, by the cementation process, removed the high lead content. There is no evidence that appreciable quantities of calamine were found in England before the sixteenth century, and it appears that this may have led to the importation of higher grade copper alloys from the Continent. It is also likely that many of the small fine objects in common use were imported in their manufactured state. Very large numbers of some types of book
clasp, in particular the edge-to-edge design with feather-work and piercing, can also be seen on continental books suggesting that these were imported in quantity. The metal of which these are made and the general high quality of the casting both suggests that this is not English work. Indeed, it is probably the case that some of the better imported copper alloy in its sheet form may have been melted down and adulterated with lead or poorer grade English alloy containing lead and zinc to make it go further in the production process.

Distinguishing book clasps in terms of the method of manufacture (i.e. cast or hand cut and decorated) presents a more difficult problem.

Metal fittings of all sorts were a part of everyday life in the fifteenth century. Clothes fasteners were commonly made of metal, Pilgrim Badges and Retainer Badges were also very common in the late medieval period. It is likely that many of these were imported as finished items, but a large proportion were also manufactured in England. Objects were made of various metals. Many Pilgrim Badges, for example, were made of cast pewter whilst some were die struck free-hand on to a lead/tin plate material. Lead was also in common use for small metal objects such as amphora to hold Holy Water, and it was used to make other associated pilgrim artefacts such as the Bird Feeder, the Boy Bishop token and so forth.

Coinage in England does not provide much useful information because of its centralisation, except that it does show that casting was by no means a universally accepted method of producing small metal items. The overwhelming bulk of medieval coinage was struck free-hand, and one metal commonly used was silver. In 1299, the re-coinage of Britain (ordered because of the deterioration of the coinage through clipping) was moved to the Mint in the Tower of London where it remained until 1970. The method of casting coins was favoured in Antiquity, and so was not unknown in the medieval age. In Italy at the end of the fourteenth century the casting of coinage was re-introduced but it does not appear to have been taken up in Northern Europe. However, it is relevant to metal book
fittings made in England because some of these were made using a casting technique.

The history of printing itself reveals much about fifteenth century metalwork and the critical stages of its development. Pioneers in the making of letter punches were greatly helped by the experience of the goldsmiths and by the engravers of medallions and of coin makers, who were more often than not recruited from the goldsmiths. From the thirteenth century, metal founders knew how to employ punches engraved in relief to make clay moulds from whose hollow matrices relief inscriptions on crests could be made. From the beginning of the fifteenth century, the techniques of casting from moulds (whether metal, or a mixture of fine sand and clay) and of die stamping were all well established and in current use. It was also known that one could punch out a matrix in a metal and then cast metal in it, in order to obtain characters in relief, which is of course the principle of letter founding.

Some of the book clasps appear to have been cast, and many have repeated standard type patterns, suggesting that they were produced in great quantities by small metal workshops making specialist goods for a number of trades. Brasiers would probably be making larger objects than clasps, but some of the clasps are of such fine quality that it seems likely they were professionally produced rather than made by a craftsman in a different trade. The casting of the clasp is probably only one stage in its manufacture, and most of the clasps would have required extensive additional finishing with burins, files and so on. The metal fittings have common features but retain an individual identity and are in this respect very diverse. They could become an important source of information in the dating and localising of bookbindings. It is apparent from the survey that some fittings and methods of clasping are more common in one centre of binding than others.

There is clear evidence that some of the clasps were engraved with burins, fine chisels and knife points, all made of steel. There has been a tendency to categorise some of the fittings in date order according to the naiveté of
the engraved work, but this approach is not always confirmed by the design of the clasp and the way in which it operates as a book fitting. Many of the decorative patterns and designs to be found on book clasps are also found on belt strap ends, clothing hooks and other pieces of small decorative metal work. Could this sort of work have been a sideline of the blacksmith's work in the monastic setting or is it more akin to the work of the goldsmith? The quality of the work is variable and it is hard to establish anything definite, but when examining the clasps themselves it can be seen that that some of the work was painstakingly accurate and fine, whilst other work is crude and amateurish - no doubt the work was undertaken by individuals with very different skills.

An element of mass production was apparent by the end of the period, and as the numbers of books grew so a wider range of book fittings would have become available, some more expensive and some relatively cheap. The cost of the fitting would have been reflected in the quality and detail of the work. It is interesting to note that the poorer examples seen all seem to copy in some way or another the decorative motifs of the more skilful craftsmen. The sense of a standardisation in some of this work is quite remarkable. Amongst the sample of one hundred archaeological examples, time and again edge to edge clasps can be found which are superficially identical, but which nonetheless have different decorative details.\textsuperscript{168}

As already mentioned, there was an immense range of small metal fittings in common use during the later medieval period, and the use of decorative features was equally diverse and widespread. In general, in the first half of the fifteenth century, book fittings were rather plain but special books were clearly given above average treatment. For example, silver was sometimes used for making book clasps and this was sometimes cast to provide a decorative feature. In this case we cannot be sure that this is

\textsuperscript{168} It seems that in some cases we may be looking at a cast clasp (perhaps imported) which was blank or partially blank and which has been finished using burins and punches.
English work, because it was simply a field find and has no provenance. However, a clasp of this sort tends to suggest that it may have once been a part of a rather more elaborate and expensive binding, perhaps for a devotional book such as a Book of Hours. In other cases the copper alloy used to make clasps was pierced and given decorative feather work. In other examples the use of function has been merged with decoration to provide a grotesque. In the case of one copper alloy cast side-pin catch the use of a fish scale pattern has been put to good effect. Here, the design appears to have been added to a casting with the use of a circular punch.¹⁶⁹

In some ways, it is the more standardised design use which is the most interesting feature of these ephemeral pieces. On examining the very common edge-to-edge clasps of the latter half of the fifteenth century, it is clear that the patterns are in widespread use and have travelled through many workshops. Perhaps like the Flemish examples were made in large quantities on the Continent. The variation in quality and detail between one clasp and another is testimony to the fact that the clasps shown have all been finished by different craftsmen.

The methods of manufacture vary considerably according to the nature of the decorative design. The very common edge-to-edge clasp, often associated with the early printed book, is so common that one expects to find some evidence of manufacture. The archives at Durham Cathedral (advice provided by Professor A. I. Doyle) prove that when planning a lot of work bookbinders bought clasps in quantity during the fifteenth century. The availability suggests a large scale Continental manufacturing base.

In the case of a simple cut and decorated clasp (Private Collection, Photograph 52 b), it is obvious that manufacture is entirely by hand. Here one can see the effect of decorative punches which have been quite heavily struck into the metal. This type of clasp was cut from 1 to 2 mm. thick

¹⁶⁹ It is impossible to date such finds with accuracy beyond saying that they
copper alloy sheet, cut and filed to shape and decorated with files and burins. It is hard to be accurate in describing the type of decoration intended because the work is not fine, but it undoubtedly involved the use of a lozenge-shaped stamp, which is divided into tiny diamond shapes forming a grid. This tool is used in a straight line three times down the centre of the clasp, and is interspersed with a simple single circular punch which is also used to form two parallel lines of decoration on either side. At the end, the clasp is finely decorated with light punch work and with some engraved cuts. This type and design of fitting can be seen on many books, and on decorated strap-ends, of the thirteenth century and onward.

The metalwork on books which retained a clasping system involving a long strap and side pin was almost certainly cast. The shape of the strap end is usually bulbous and rounded, and the addition of decoration would have been rather difficult and time consuming. The detail on some of the clasps is quite remarkable, as for example the hair depicted on the animal head surrounding the tassel hole on one of the archaeological finds.

The flat metal loop, which attaches the clasp to the strap and through which a pin is passed to connect strap, loop and catch, is simply cut from a piece of copper alloy plate (anything between 0.5 mm and 1.5 mm according to scale). These can be plain or decorated. Decoration is usually achieved by means of a series of file or engraved cuts to the edges of the loop.

Some of the fittings have apparently unique design features. For example, in one instance we can see a very plain undecorated catch for a side-pin arrangement, where the tongue of the metal loop attaching the loop to strap to catch is angled to receive the angled arms of the catch through which the pin is passed. This angling of components has the effect of restricting the opening characteristics of the catch very significantly, because as the catch is lifted so the arms readily lock against the loop passing through them. There is little sign of wear, and one imagines that are late medieval.
for a book clasp this design had many advantages, for when the book clasp was to be used again the catch would almost automatically fall into place.

In the case of the silver catch, it is noticeable that the arms for the pin incorporate a third arm in the centre. One wonders if this is an example of the metal worker taking into account the comparative softness of the metal he is using and thus adjusting a simple design to ensure that the catch is durable?

**Metals and Gilding**

The use of semi-precious metals in decorative book clasps of the fifteenth century in England seems very rare, but there is some evidence that a number of metal fittings were once gilded to add a richer and more lavish overall appearance. Theophilus records, as previously mentioned, that gilding certain copper alloys is not easy, and in general the gilding of book clasps is rare. Indeed, one would have to use a high grade of copper alloy without the presence of lead if gilding were to be possible at all. However, gilding of metal in the fifteenth century was far more common than many realise, and even the humble metal Pilgrim Badges and Retainer Badges of the period show clear evidence of gilding work. Gilding on metal book clasps is often difficult to recognise, having been so heavily worn, and because of the shortage of survivors in-situ, it is difficult to assess in this context. There are some examples which suggest a more widespread use of gilding on book fittings (Private Collection, Photograph 52 c shows Gothic, Romanesque and Anglo-Saxon pin catches).

There is some evidence to suggest that cheaper book fittings were also made of iron, but these survive only as fragments in the edges of book boards. These iron catchplates are of a one-piece type which has been cut from a flat piece of iron, the catching hole being drilled and filed. Such fittings were usually fixed with iron nails. It is interesting to note that there was obviously some respect for the metals used in manufacture. The binder would fix copper alloy plates and clasps with copper alloy cut nails, and he would fix iron with iron. No example of an iron clasp was found in
the course of the survey, only examples of catchplates, and these were comparatively rare.

Book Decoration

Decorative features were frequently added in blind on tanned calf bindings and on one or two examples of tawed bindings. The tools used were of two basic types. Engraved stamps of copper alloy were used, and fillet wheels were also used to create grids of straight lines in various arrangements associated with different centres of binding. In addition, the pallet most likely featured in the early bookbinder's tools (Diagram - Typical late fifteenth century blind stamped tanned calf binding).
Chapter 5

Tools and Techniques in the making of

English Fifteenth Century Bookbindings

A great deal has been written about the history of technology in the late medieval period, and apart from the general texts and standard authorities there are numerous reports of archaeological finds which supplement our knowledge of which tools were available. In this section the intention has been to describe aspects of the history of technology in the context of very specific elements in the binding of medieval books. The picture is to some extent fragmentary because the marks left by the bookbinder are often the only surviving evidence of tool usage, and much of this work is therefore speculative. The illustration is enriched by reference to contemporary illustrations of workshops, such as that found in the Book of Trades (Amman 1973 p.29) (Photograph 53) and by other illustrative manuals from later periods such as that by Dirk de Bray of the early seventeenth century (de Bray 1977).

The dimensions of a fifteenth century workshop were suggested in Chapter 2. A workshop measuring in the region of 10 to 12 feet square, can be filled with many tools, but this may not have been necessary, for it is possible that division of labour meant some activities may have been undertaken by other craftsmen. It is entirely possible, for instance, that the carpenter prepared book boards for the binder, that the currier provided the binder with skins and leather virtually ready for covering, and in the sixteenth century we know that some printers sold text-blocks in sewn form\textsuperscript{170}. However, in many cases it is likely that the binder continued to maintain responsibility for all aspects of bookbinding work, particularly in

\textsuperscript{170} Referred to by Nicholas Pickwoad and illustrated with a volume from the Plantin Moretus Museum, in his lecture to the Bibliographical Society (Romee Handeiria Lecture) 1991.
the case of remote provincial work. The woodcut in Jost Amman’s *Book of Trades* dated 1568 clearly shows that binders’ tools commonly included the following (starting from the top left corner of the woodcut and moving to the bottom right hand corner) (Amman 1973 p.29):

1. Sewing frame built into tabletop - German style with metal hooks
2. Polishing iron
3. Pair decorative rolls
4. Skein of sewing support cord
5. Backing boards with tying-up hooks
6. Heavy gimlet or auger
7. Pair of files
8. Carpenter’s side axe
9. Two screw (laying) presses
10. Bookbinder’s plough
11. Beating hammer
12. Draw-knife (presence of plough suggests that this was probably in use for board shaping)
13. Carpenter’s bow-saw

The right-hand wing of an altar-piece by Robert Campin, ca. 1420-38 (Campin 1956, Plate 12), depicts St. Joseph, the carpenter, making mousetraps (Photograph 54). The picture includes the earliest illustration of a brace, but the auger is still much in evidence and was still the main tool for making holes requiring strength and force. The chisel, pincers, hammer, chopper, squaring axe and one-handled saw can also be seen.

In the miniature by Jean Bourdichon ca. 1500, the same basic tools can be seen again, except this illustration also shows the smoothing plane in the foreground (adjacent to a small adze suggesting that the tools were
complimentary to one another) whilst the carpenter is shown finishing a plank of wood with a trying-plane (Bourdichon 1956, Plate 356) (Photograph 55).

Tools

Tools were valuable objects highly prized by the craftsmen who owned them. The quality of the tools themselves was very variable, and some appear to be modifications of other tools or items of domestic use. The majority of tools discussed here were made of iron, wood or leather and combinations of these materials.

The axe was in universal use for the felling of trees and for the cleaving of wood. The froe was also in use from the earliest times to assist with splitting felled timber, and these would quite likely be used in preparing quarter cleft timber. The woodsman’s axe was wedge-shaped in profile and is easily distinguished from the carpenter’s side-axe which was sharpened on one face only.

The cabinet maker’s axe was undoubtedly in widespread use for the shaping of book boards. The adze, on the other hand, was used for surfacing timber prior to the cutting and shaping of some boards and its marks are also seen from time to time (Photograph 56). This tool could vary enormously in design, from the comparatively light-weight adze hammer to the full size carpenter’s adze used for surfacing boards and planks in housebuilding. The adze was an extremely versatile tool and in skilled hands its use can be difficult to distinguish from the use of the smoothing plane. The smoothing plane and other larger planes were in use in the fifteenth century, and book boards regularly appear to have marks which are consistent with the use of a plane. However, planes rarely appear in medieval building accounts and were regarded more as a joiner’s tools for fine work.

The majority of fifteenth century bookbinders used the cabinet maker’s axe when shaping book boards, but there can be little doubt that the smoothing plane was also in widespread use. Book boards were noticed in increasing
numbers towards the end of the fifteenth century where a plane had apparently been used to finish the outer board face where the inner board face revealed that the board had been originally quarter cleft. The question again arises as to whether or not the bookbinder was buying in boards from another source, which he then modified to fit the specific book. Boards were very often observed where the degree of cushioning was similar in profile but out of balance when head and tail cushioning were compared - implying that the board may have been reduced from one end after the cushioning had taken place. (Jesus College, Cambridge, MS. QB4, Photograph 57).

The marks of the cabinet maker's axe are very common and are characterised by the nature of the tool's action. Skilful use of the cabinet maker's axe need not look like a tearing action and the surface does not have to appear as a hewn surface if the shaping is achieved with a very sharp edge taking off thin layers of wood one at a time. Comparatively quick and crude work will produce a board with a distinctly hewn appearance which may even have been executed with a small axe (Pembroke Collection, Cambridge - fifteenth century board re-shaping, Photograph 58).

As for drill bits, the medieval craftsman largely relied upon the spoon-bit, with its characteristic open spoon-end cutting shape. It was not until the nineteenth century that the spiral bit was introduced which enabled the drill bit to clear the hole as it progressed. However, the gimlet and auger maker did forge (rather than file) one or two turns to the end of the auger or its small equivalent the gimlet. The lacing holes found in fifteenth century book boards tend to be angled on entry and vertical only at the second hole where the lacing was to be pegged or wedged. It is possible that the gimlet was sometimes used as the tool in making the lacing holes in book boards. (Private Collection - pair of late medieval augers, which show the slightly spiralling effect to the square shank caused by the forging, Photograph 59). The bow drill was in common use from Roman times and the pump drill was also in regular use from early times. Drills of this sort
are reciprocating, and therefore the cutting edge of the bit may be sharpened on both faces, unlike those designed for continuous rotation which require sharpening on the cutting edge only (Aldred 1956, p. 231).

The manufacture and use of iron chisels had reached a sophisticated level by the late medieval period, and it was not uncommon for the maker to sign his work with a personalised maker's mark. Gouges of fine quality were also in use for channelling wood. Files were also made to high standards, suitable for the working of fine metal objects, and there can be little doubt that certain metal book fittings were either made or altered by the bookbinder as part of his everyday work. Files were made with a sharp-edged hammer which was used to deliver controlled and highly accurate blows to the metal, thereby leaving a line in the metal against which the filing occurs (Thomson 1954 p.394) (Photograph 63). See also Photographs 59-64 of medieval tools).

The bookbinder's workshop would doubtless have included a number of knives. Cordwainer's knives discovered in archaeological research have a characteristic shape and are provided with a tang for a handle of bone or wood. The knife is derived from the half-moon knife shape; it was sharpened along the curved edge, thus providing a paring face, and was also sharpened on the short straight edge providing a strong trimming area. These knives may have been in more general use than has been assumed, but most early illustrations of leather work depict small half-moon knives and small sickle shaped knives. The stiletto was also used in leather work (Margeson 1993 p.189-190). As today, knives used in leather work were widely adapted to serve specific functions, but the archaeologist finds it difficult to state specific roles in the presence of a wide array of

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171 By the late medieval period, the cordwainer is essentially associated with shoemaking, having long since relinquished claims over specialist Spanish leather working from which the name originally derived. However, the use of kermes-dyed alum tawed skin, which was developed as an aspect of the cordwainer's work, was certainly not dead by the fifteenth century.
shapes and sizes (Margeson 1993 p.191). The paring knife of the present day may well be echoed in antecedent forms, although it is the modern French paring knife which seems to echo the past most clearly, being presumably a derivation from the cordwainer’s knife.

Examples of Anglo-Saxon hinged scissors have been found, but during the medieval period they were largely used by specialist tradesmen such as glove-makers, tailors and bookbinders. The cost of making scissors and the skill required in their manufacture meant that shears remained the preferred method of cutting most materials. Heavy hides and animal skins would certainly have required shears in any case (Photographs 65 and 66 showing medieval and seventeenth century shears of suitable weight for bookbinding).

The draw-knife was used by the bookbinder for two purposes. It was used in the conventional way for the purpose of shaping wood and, as with the cabinet maker’s axe in competent hands, it was a versatile tool in woodworking (Photograph 67). Draw-knife marks were found to be common on fifteenth century book boards, particularly in the shaping of steep cushions and for bevelling. It was, as previously mentioned, also observed as a tool for smoothing a rough surface on the binding of Corpus Christi College, Cambridge, EP.D.10 by Oldham’s binder D, although it is clear that the user experienced some difficulty in obtaining a satisfactory finish and it is arguable that these are the marks of another as yet unidentified tool.

The draw-knife, as previously mentioned, was also used for the purpose of cutting the edges of the text-block and its marks are frequently noticed on both paper and parchment edges. Its use for this purpose is so widespread that one might almost claim universality, except that it is also clear that certain book edges remained untrimmed and some were ploughed in boards from the late fifteenth century onwards. Establishing the technique used in edge trimming can be very difficult where some form of chisel cut has been used, but the draw-knife invariably leaves its characteristic mark.
Chapter 6

Conclusion

The structure and physical archaeology of the book within the context of decorative bookbinding History

Materials and Methods

The analysis of fifteenth century English bookbindings, using new archaeological techniques, helps us to understand the relationship between the craft of bookbinding and the rapidly developing history of the book after the advent of printing. In examining the technologies available, I have tried to clarify the way in which the craftsmen worked. I have drawn a number of conclusions about marks on bindings, indicating the techniques employed in the manufacture of wooden boards, and the way in which workshops adapted to the changes in covering materials. However, it seems reasonable to assume that my conclusions concerning the structural development of different bindings from different decades of a single century are representative of overall trends.

By the end of the fifteenth century English bookbinding was transformed; far more than just the outward physical appearance had changed. It was generally suggested to me by long established binding historians that the structure of the late fifteenth century book much the same as that of the late medieval book (i.e. differed only in detail from the bindings of the fourteenth century and earlier). In many respects this is true, because the materials used (with the notable exception of the revival in the use of tanned leather in the late fifteenth century) were indeed much the same. However, it is clear that changes were taking place towards the last quarter of that century. The practice of sewing with the linked herringbone structure was largely superseded by the easier, quicker and more straightforward all along sewing. The channelling of lacing paths also became increasingly rudimentary, with less attention paid to the gouging
and chiselling of channels. Towards the end of the century the channelling
was increasingly truncated and, being shorter, involved the binder in less
preparatory work. With the switch to tanned covering came the gradual
introduction of tanned supports. The shaping of oak and beech boards also
became a far more mechanical process, and there is every indication that
the wood plane was in wider use, taking over from the carpenter's axe.
There is also evidence that the draw-knife was in common use to speed
the finishing of boards. The quality of late fifteenth century wooden boards
is sometimes very fine indeed. In some cases, boards of the earlier decades
of the century are very roughly hewn with a carpenter's axe. The late
fifteenth century binding is not a debased structure, and there was a
definite response to the challenge of greater numbers of books requiring
binding.

Though émigré influences did affect English bookbinding in the fifteenth
century, it must not be thought that this knowledge spread rapidly
throughout the craft. (Foot 1993 pp.146-163) (Pickwoad 1994). The
bookbinder remained an inherently conservative animal, and the
survival of older techniques (notably in much provincial work) strongly
supports this view. The fact that one can still find examples of channelled
lacing on fifteenth century books proves that earlier traditions had not
been forgotten. These are not aberrations which prove a rule, they are
practices which survived in the workshop. It is a great sadness that so few
bindings survive to show beyond doubt how commonly these techniques
continued to be used. In spite of the inherently conservative nature of the
craft, the bookbinder quickly adapted his approach to binding and in the
sixteenth century the large numbers of printed books forced an
abandonment of traditional binding methods. The work of the London
binders (the Scales binder being the obvious example), and some of the
later Oxford and Cambridge binders, indicates that the adoption of new
methods in response to the demands of fashion and circumstances led to
the introduction of new materials (in the sense that they had never before
been used in this way e.g. tanned leather for supports, gesso for
highlighting decoration) and decorative patterns.
What does this tell us? Essentially there are two points. The binder of the fifteenth century was still conservative in his overall approach, and retained many of the techniques which the previous centuries had provided. But he was also adaptable, and took on new influences such as styles and structures reminiscent of the Netherlands and other parts of the Continent. This makes it difficult to say whether one is looking at the work of an émigré or of an English binder. The conservatism of the craft is therefore overruled when established practices no longer work in a new situation, and there is even a willingness to jettison completely some structural traditions.

In the history of books and bookbinding, the fifteenth century represents a watershed, and therefore it presents a number of problems of interpretation. For the historian of the book, the single greatest event of the century was the invention of printing with movable type, and it is inevitable that anybody studying the period will be looking for cause and effect in this revolutionary event. The orthodox view of bookbinding history states that printing did not in itself lead to an immediate change in the way in which books were bound. However, there can be no escaping the fact that Gutenberg's first imprint, dating from 1455, did have a marked effect upon allied trades.

The sixteenth century explosion in book production was anticipated to some extent in the latter fifteenth century. In the early decades of the century it is not uncommon to find special books being sewn on 6, 7, 8 supports (e.g. breviaries for regular worship, pontificals and antiphonals for ceremonial use), but by the end of the century the bindings have become more uniform, as bookbinders adopted similar styles. In the decades of the incunable, I found that the number of books bound on four equidistant supports was a dominant feature. These books far outnumbered alternative structures in a ratio of 75% to 25%. In the 1440s this feature was noted in only 50% of the books studied.

In England, the characteristic late fifteenth century binding in tanned leather with blind tooling appears to represent something of a revival (in
contrast to the numbers from earlier decades bound in tawed skin). This may well tell us something about the conservative nature of English bookbinding practice. It does seem odd that in England there are few tanned bindings prior to the introduction of printing. It may be that the tendency to used tawed skin was deeply ingrained, except of course for coverings in limp and semi-limp parchment, and paper. (Here I am only considering wooden boarded books). It seems likely that the revival of tanned covers in England during the second half of the fifteenth century (which rapidly led to a preponderance of tanned calf bookbindings) came from the Continent, most likely spreading from the Germanic world, and in this very narrow sense it may not be a straightforward re-introduction of the twelfth century Franco-English tradition. The paradox is that English blind stamped decoration has more in common with the few surviving twelfth century English exempla. It could be argued therefore that the Netherlandish and Germanic world took the twelfth century Franco-English example as inspiration, and was then responsible for its re-introduction to the fifteenth century English binderies.

Manuscripts were bound in tanned leather throughout the medieval period, in varying numbers and in various European centres. In England and France, a small number of blind tooled stamped bindings on leather were a feature of the period from about 1150 to 1250 and ceased in the thirteenth century. These bindings seem to have centred on Paris, London and Winchester, (Pollard - Some names - p.197), but they were extremely limited in number when compared to the vast bulk of plain bindings produced in the same period. In the Germanic world cuir-ciselé techniques were used to decorate books bound in tanned calf and in tawed calf from 1350 to 1500172. Throughout the Romanesque period in England, the preference for alum tawed skin, with no decoration, is obvious. Surviving examples of early bindings, though lamentably few in number, prove

172 In this particular case the geography can be narrowed to Austria, Bohemia and Southern and Middle Germany (Szirmai 1983 p.59-62).
beyond reasonable doubt that the use of tawed skin - either white or stained - dominated the scene.

Whilst tooling is not structural, it cannot be ignored. The historic evidence provided by tooling designs is vital to the understanding of the spread of structural practices, though if taken in isolation, it is an incomplete source of evidence. Tooling of bindings, in association with the introduction of tanned leather, also shows the revival of twelfth century techniques. This is because the formats are so similar. There were however, many tanned-covered bindings with no tooling and to some extent this begs a question: "Did the decoration come as a secondary element in the revival, or were the two features adopted simultaneously, one as part of the other?" There can be no doubt that tooling tawed skin is difficult, and whilst some tooling was found on fifteenth century English tawed bookbindings, this seems to relate to an attempt to copy the tanned bindings of the period. It was not until the sixteenth century, with the great Germanic blind-stamped panel bindings, that we see tawed skin mastered in a decorative sense. There are, of course, notable exceptions, and although these have tended to be viewed in isolation, one must never lose sight of the fact that so many bindings having been lost we can never be sure of how common a feature this may have been.

The very handsome example of the Paduan bookbinding now at the Pierpont Morgan (Santa Justina circa 1410), once in the collection of E. P. Goldschmidt, proves that tooling was possible on tawed skin. This magnificent example was made in a Benedictine monastery, and according to Goldschmidt the ownership inscription of the upper cover (ISTE LIBER / EST SANCTE / IUSTINE / DE PADUA) makes it "the earliest known monastic binding with its provenance clearly marked on the binding itself" (Needham 1979p.77). The tradition of tooling on tawed skin never became firmly established in England (although a few examples were noticed at the time of this survey e.g. the simple fillet line grid, tooled deeply on the heavy limp tawed cover of the Statutes of Rotheram College now at Sidney Sussex College, Cambridge). For tooling on tawed skin one
has to look to the German tradition of the and principally to the great pig skin bindings on beech boards associated with the sixteenth century.

As stated earlier, the English revival of the Romanesque binding with tanned leather covering may have come from the Continent. However, Graham Pollard has argued very convincingly à propos decorative features, that the use of blind stamped binding designs came from Winchester to Oxford, and that it did not really begin in earnest in Cambridge until the 1480s. He attributes the source of the Winchester Romanesque influence on fifteenth century Oxford bindings to William Waynflete, (Headmaster of Winchester College 1412-1429, Bishop of Winchester 1447-1486, and Founder of Magdalen College) and cites the earliest known example of a blind stamped fifteenth century Oxford binding, bearing the arms of the See of Winchester, which is to be found in Magdalen College Library, Oxford (Pollard 1970p.203). His assertion that bindings from London have not really been sufficiently researched for a true understanding of their significance to be appreciated, holds as well today as it did at the time of his writing. The work of London binders is likely to have been as significant, if not more so, than the work of the binders in the University and Cathedral towns. It seems certain that the influence of the Continent was more profoundly felt in the capital, as witnessed by the development of new English designs based upon Flemish practice. The work of Mirjam Foot in recognising the influence of Netherlandish decorative influences on English practice is particularly worthwhile, and demonstrates the way in which practices from Europe spread through London and thence to the provinces. The influence of Caxton's binder in decorative terms is particularly relevant in this respect and demonstrates that London practices arrived first in Oxford and then Cambridge. It is hardly surprising that foreign practices were absorbed by the English book trade. For the first few decades after the introduction of printing to England the entire trade was dominated by foreigners. Foreigners imported most books into England, and the demand for books was acute and remained so until well into the sixteenth century. Mirjam Foot has established that tooling came to reflect the national characteristics
of the stationers (e.g. Henry Frankenburg) and printers (e.g. Caxton) who supplied books and who sometimes based themselves in London. She cites as examples the tooing on a number of books bound for Thomas Hunt and Theodoric Rood in Oxford which show a distinctly Louvain influence. These originated from the press of Jan van Aken, otherwise known as John of Westfalia. (The identity of Jan van Aken was revealed by the work of R. Juchoff - 'Johannes de Westfalia als Buchhandler'). (Juchoff 1954 pp. 133-6)

A study of decoration on late fifteenth century books is of value to the historian of book structures for what it can tell us of the great variety of influences in the bookbinding trade, and in helping us to attribute specific practices to key towns and cities. Decoration is essentially a factor determined by taste and fashion, but it clearly shows that Continental influence and tradition played in the binding of English books. The revival of the blind tooled tanned binding is important because such bindings were rapidly affected by structural developments in a way that conventionally covered tawed bindings were not. New techniques such as half pack sewing, sewing on tanned supports, simplified lacing practices, regular use of adhesives on the spine, tying-up, back-cornering and the changing of the endband into the headband, were a few such features observed. The problem facing the binding historian concerns the motive in converting from one style of binding to another (i.e. from the plain tawed to the tooled tanned). That this happened at the same time as the introduction of printing cannot be coincidental. That it occurred when the use of paper was increasing dramatically (in the sense that more manuscripts in England were being written on paper) and at a time when many more books were being produced must be noted. The anomaly is that, in England at least, the transition seems to have been almost universal, except in the restricted terms described earlier in this thesis. The use of tanned leather in the Germanic world (as opposed to tawed skin on any scale) seems to have commenced shortly before 1460 and spread across the whole of northern Europe very quickly.
The evidence suggests that the change in materials did not exclude the use of tawed skin, as has been suggested by leading scholars in the past. (Pollard suggests that tawed skin bindings were very rare after the mid-fifteenth century, but this cannot be true - even within the confines of England, examples of printed books in tawed skin, were found for this survey both in Oxford and Cambridge (Pollard 1970p.197)). In the German world, tawed skin was about to witness something of a renaissance, and the use of tawed skin as a sewing support material persisted in many workshops, suggesting that it was still present in the shop as whole skins. Nicholas Pickwoad has suggested that many fragments were obtained from allied trades for the purpose of sewing support - citing the abundance of coloured tawed skins observed on sixteenth century bindings, though the variation in colour was not seen on English fifteenth century bindings. The fact that tanned supports are so often observed in books with tanned covers suggests that in these cases tawed skins were not present in the workshop. The correlation between tawed supports and tawed covers, like that between tanned supports and tanned covers, is quite clear in the survey findings. However, it is difficult to be too certain on this point; one suspects that plain bindings of both materials have been lost in far greater numbers than have tanned blind tooled bindings, because these would have been cherished by successive generations of owners, and the comparative survival rates must produce an imbalance in the statistical evidence.

The fact that decorated bindings had aesthetic appeal is of course relevant to the potential sale of the book, but it is a mistake to believe that decoration inevitably constituted an expensive embellishment. Much of the finishing work was very hastily executed, and there is much evidence of overheated tools - to the extent that one often observes scorching and actual burning of the leather. This could be incompetence, or it could be a symptom of the speed at which these binders were working. As Pollard points out, production in Cambridge, began late, but once underway, it probably exceeded that of any other area. Surviving bindings by the Unicorn Binder approach one hundred in number, and bindings by the W
G binder are in excess of the same number. Production must have been very fast indeed. It was undoubtedly fashionable to have books with blind stamped bindings, but from the binder’s point of view, tooling was quicker and easier to execute than one might imagine. Utilising a standard layout for the design, it would have been possible simply to tool the pallet and fillet lines to a pre-arranged grid and to add the individual stamps thereafter - presumably at an extra charge. This explanation could account for the high degree of consistency of the layout of tooling in one centre when compared to another. That this arrangement of tooling was in two stages is supported by evidence of the comparatively small number of bindings which survive with fillet lines in situ, but without the second stage completed, as can be seen in the example from Clare College, Cambridge, mentioned previously.

In the case of tawed bindings of the fifteenth century it was still common practice to supply a chemise (and the evidence of this research supports this conclusion). The time needed to produce a tight fitting chemise with edge piping and sewn envelope flaps, was considerable compared to the time it took to tool a tanned binding (with a pre-determined pattern, using a few basic hand tools and with no great attention to pressure, temperature or accuracy). This is likely to come as something of a surprise to those who have always considered tooling a greater luxury. In fact, a modern experiment suggests that the former represented about eight hours work, whereas the latter could be achieved in about two hours.\(^{173}\)

The placing of tooling in the making of blind stamped books is invariably casual, and the degree of pressure applied to the tools is generally inconsistent. Only in a comparatively few examples does one see great skill and accuracy in the execution of the work. Cambridge bindings tended on the whole to be rather more crudely finished than books from Oxford and

\(^{173}\) It is always difficult to assess times taken in achieving specific tasks using modern techniques and tools. However, the purpose of this modern
London. All locations have exceptions to the rule. The work of the Unicorn binder in Cambridge (arguably the work of Walter Hatley, University Stationer, though Graham Pollard has doubts about this identification and considers that Hatley is probably better suited to the mnemonic Heavy Binder title) is in general of better quality than that of his contemporaries. The work of the London Scales Binder is usually very fine and he clearly had a high degree of competence in cuir-ciselé. The Fishtail Binder produced a number of very finely tooled bindings with a high degree of accuracy in the placing of the tool and in the pressure applied. His work is particularly pleasing to the eye and he was probably responsible for the finest bindings of this type. (Pollard has suggested that the Fishtail Binder was possibly Christopher Coke, who succeeded Thomas Hunt as University Stationer in Oxford in 1492). The Greyhound Binder working in Cambridge, (a very fine example of which belongs to Pembroke College, Cambridge MS. 309) also produced fine bindings with tooling carefully placed, with even pressure applied at an appropriate temperature. At the other extreme, the work of the Demon Binder is casual, with comparatively careless and uneven placing of the tools and with burning of the leather. The work of the Dragon Binder (possibly Thomas Bedford an Oxford binder who was binding books for Magdalen College in 1487) also exhibits a casual approach to the placing of the tools, with uneven pressure applied to the tooling. The Caxton Binder (possibly Jacobus Bokebynder from Bruges), who first introduced the diaper design of tooling, with the centre of diagonal fillets (this was taken up in both Oxford and Cambridge shortly after its first appearance in England in 1477), often experienced difficulty with the accurate placing of tools and sometimes he applied the tool so heavily that he cut through the thickness of the leather(Pollard 1970 p.206). It was obvious that some of those books decorated with blind tooling which was rather amateurish had not received the same degree of attention from scholars, and as yet remain

experiment was not intended to establish actual times taken, rather it was intended to provide comparative evidence for two different operations.
unidentified or even unidentifiable. The craftsmen who made the books of the Romanesque revival at Oxford seem to have been rather more attentive in the quality of the tooling.

To return to the structural features of the fifteenth century binding (using Peterhouse MS. 12 & 13 as examples) - these plain tawed but complete bindings represent the Indian summer of medieval bookbinding. The component parts - chemise, strap and side pin fastening with a long protective fore-edge flap, text-block of parchment leaves, endbands - and most of the structural details, can be viewed as an evolutionary development of bookbinding with clear connections to the codex in the Romanesque form and some of its antecedents. The quality of craftsmanship continues into the first decades of the century - albeit in a modified way. The fine decoration on the copper alloy metalwork, the titling on the outside face of the upper board, the heavy bosses are all features characteristic of earlier work. The fact that the chemise is attached differently at the lower and upper boards (by no means a unique feature of fifteenth century work - one side is a continuation of the chemise itself the other has a traditional envelope flap) is a feature indicating adaptation and places the binding in the later medieval age. The depth of the skirt in this early fifteenth century example (which has a circuit sewing with a tanned edge piping) is traditional. This is a structure which persisted but there are ever ever fewer instances in the sixteenth century. It underwent continuous modification, increasingly so in the closing decades of the fifteenth century, and was eventually usurped by the now familiar printed book binding.

An examination of the use of covering materials in this period reveals that leather from Cambridge had a depth of red coloration suggestive of mahogany, with an almost translucent quality. This could suggest local tanning, possibly affected by the supply of tannage and by the alkaline water of the area. The mid-yellowish brown of Oxford tanned calf skin suggests a different tannage and tannery, as does the intense depth of the brown to almost black of London leather. We are not talking here of the
colour of the dyestuff itself, rather we are speaking of the nature of the
leather which, when dyed, brings out a particular characteristic, a
combination of tanning and the subsequent effect of the dyeing process
upon the tannage. It is surprising that one can identify the origins of
bindings by observing the qualities of the colours described and then
comparing the tooling evidence. The success rate is well in excess of
seventy per cent. Time and again one can identify Cambridge, London and
less frequently Oxford bindings by this technique. In many ways this seems
peculiar, because one would expect the trade in leather to be as active as
that of any other merchandise, but it seems that in the case of tanned calf
skin for bookbinding the supplies were drawn largely from local tanneries.
Perhaps because the supplies of leather were in such demand, and perhaps
because tanneries were present in such abundance, with all of the tanning
materials locally available, the supply simply fed the local demand.

The increased use of paper to meet the increased demand for books (due to
higher levels of literacy and learning resulting from an expansion of
formal and informal education and also the advent of printing) brought
pressure to bear upon the bookbinder. This made it necessary to find an
alternative binding material. Leather, being locally available in quantity
and almost certainly cheaper than alum tawed skin, (I have no
documentary evidence for this, but assume that the volume of production
and the circumstances of manufacture would account for such a
difference) must have been the obvious choice. Leather was already in
widespread use in other trades, and the crafts of shoemaking, tailoring and
saddlery had been intimately linked to a supply of tanned leather for
centuries. The fact that the first tanned covers are often on books sewn on
to tawed supports (only with the 1480s do we see large numbers of books
on tanned supports) suggests that the binders quite rightly doubted the
qualities of what must have seemed like a new and consequently suspect
material - just as the early printers doubted paper and placed parchment
stays in the centre folds of the quires. The suggestion is that these were the
reasons why tanned leather took centre stage, and that the embellishment
with tooling was not the cause but the consequence of the revival of the
use of tanned skins. This seems the most plausible explanation for the widespread adoption of new materials across the whole of Northern Europe. Inevitably there were long term structural consequences as a result of this move away from the Romanesque tradition (when few bindings were covered in leather). In some ways, it is possible to view those magnificent naked (i.e. without chemise) Romanesque tooled bindings as something of an aberration, soon forgotten because of their vulnerability. In the fifteenth century the blind tooled tanned binding was a much needed short-cut, which had aesthetic appeal, and which soon became established as a fashion for the new book form, once the manuscript format had become passé. This is possibly why the manuscript itself in the last decades of the century was made to conform to the new style of binding, and possibly why, in some cases, it is considered that the manuscript was occasionally less well regarded by the bookbinder than the printed book. (This observation about the qualities of bookbindings of manuscript compared to the printed book was made to me in conversation with Michael Gullick, with reference to his cataloguing of the Hereford Cathedral Library books.) Of course, books were made for centuries without a chemise (the binding on the Stonyhurst Gospels, and on treasure bindings being obvious examples) in England, in the fifteenth century, as elsewhere, it is clear that the practice which had reached its apogee in the Romanesque era remained in regular use until the middle of the fifteenth century and then rapidly lost ground.

The study of bookbindings relies heavily upon an understanding of detail. Just as the historian of decoration must pay painstaking attention to the designs of tools and to their wear, noting variants and copies, so the historian of book structures must pay attention not only to the structure itself but also to the consistencies and inconsistencies in materials and techniques used. For example, the fact that much of the timber used in making oak boards was of Hanseatic League origin, tells us much about the difference between provincial rustic work and that taking place in the major centres. Wood of English origin was far more likely to have been used in the former than the latter and also at an earlier date. It is vital to
our understanding that as many details as possible are brought together and compared if sense is to be made of book structures. The failure of bookbinders and others to conserve details has done more to obscure our understanding in the last two hundred years than any other single cause.

The changing attitudes of fifteenth century bookbinders and workshop practices

If one compares books which fall into different categories of binding (e.g. early or late fifteenth century, expensive or cheap and so on) consistent patterns begin to emerge. It is hardly surprising that good quality books, with well written and well decorated texts, tend to be bound in good quality bindings, regardless of date. But it is also true that certain books with specific functions were accorded much stronger and better quality structures than others - for example, the case of the sewing structure on the early fifteenth century breviary, now at King’s College, Cambridge. The Norwich Portiforium recently resewn to its original sewing stations (from a 19th century rebinding on four supports) on seven supports (Clare College, Cambridge, MS. G’3 34) is a similar example (Footnote 135). Neither of these books could be regarded as being exceptionally fine manuscripts of their day, but they were both working books which would have been in almost constant and heavy use, and this no doubt is the reason for the numerous supports. Indeed, it is clear that the early fifteenth century binder still had respect for the importance of creating a sound sewing structure as the basis of a strong and durable bookbinding.

Known binders tend to achieve an identifiable competency in their work, and whilst there are obviously variations it is nonetheless surprising (with the exception of decoration) how standardised and similar are certain groups of bindings, by known craftsmen. Decoration, though differing (individually relying as it did on the use of the same tools) has remarkable consistency of layout within regional production. The craftsman himself, seems diffident about changing his overall technique; and the work of the Scales binder, is typical, in this respect, in exhibiting similar structures whilst being uniquely the approach of the one craftsman. This argument does not seek to suggest that the craftsman was not capable of binding
books in very different ways according to cost, inclination or subject - it merely suggests that in general, fundamental techniques did not vary and particular habits tend to be repeated. The Caxton binder, of the incunabula period, is an exception to this very loose rule, because he used such totally different methods of sewing and lacing books. One example at Queens' College Cambridge (identified by Mirjam Foot in 1993) is in stark contrast in terms of both method and technique, when compared to his binding of Lyndewode's Provinciale (at Corpus Christi College, Cambridge in the Parker Collection EP-M-7). In this case, one could be forgiven for believing that the forwarding at least, is the work of two completely different binders, and, given our lack of knowledge about fifteenth century workshop practice, we have to consider this possibility. Where the whole style of binding is significantly different, suggesting that the forwarding work was done by a second craftsman, a new picture of the late fifteenth century bindery emerges suggesting a division of labour for the different aspects of binding. There is great contrast between work of the kind carried out in a workshop with divisions of labour and standardised practices, and that from the workshop focused on the commissioned binder who varies work according to the special requirements of his customer (e.g. offering a more rugged and complex sewing to a client with a working book). Here we may be witnessing a fundamental difference between early and late fifteenth century bindings. We may also be seeing further evidence of the impact of the printing revolution, causing the bookbinder to modify his approach significantly. The early fifteenth century bookbinder seems to have understood commissions which determined appropriate structure and quality, whereas the later fifteenth century bookbinder may have been working as part of a small team with standardised practices of which patrons were not necessarily aware.

When one realises that a binding, ascribed to a certain binder on purely decorative grounds, does not compare structurally to other bindings allegedly by the same person, one wonders if the decorative evidence can be correct. For example, there are very considerable differences between the work of the Monster binder at Magdalen College, Oxford, (B III 3 10) which
has decidedly sixteenth century characteristics when compared to the same binder's work on Corpus Christi College, Cambridge, (EP H 5). The differences are not fundamental in the sense that totally different materials have been used, but in terms of the subtitles of structure differences do exist. The fact that the Corpus Monster binding has only recently been recognised and that other Monster bindings belong, in marked contrast, to a small group of distinctly late-looking books, led Mirjam Foot, without seeing the Corpus book, to place it tentatively in the sixteenth century. Structurally at least, the Corpus book would tend to point towards an earlier date. In fact, the Corpus binding is in such marked contrast to the Magdalen College, Oxford, binding that one doubts whether they are the work of the same individual. The lacing of the Corpus book is convergent and very rugged, whereas the Magdalen book has small straight lacing. The Corpus structure also incorporates the use of a kettleband laced into the boards to support and strengthen the kettlestitch, whereas the Oxford example is conventional. With its herringbone sewing the Cambridge example has a distinctly fifteenth century feel, whereas in aesthetics as well as structure the Oxford book appears to belong to the sixteenth century. One must ask if the tooling evidence is sufficient for dating purposes. Is this the re-use of an earlier tool? Is it perhaps a re-cutting of an earlier tool?

Graham Pollard pointed out the limitations of relying too heavily on decorative evidence, and described how tools were closely copied, how tools may have been sold second-hand, how they may have been lent from one shop to another, how a binder may own two dozen tools but only use six of them on any single piece of work, and so on (Pollard 1970p.194). The possibility that tools may have been cast in some instances, and finished with engraving, makes the potential for confusion even greater. It is generally assumed that tools were engraved in copper alloy, but the absence of good examples which can be identified by blind stamps on books, makes it very difficult to be sure of precisely how, and of what, they were made. The late sixteenth century example of a French stamp
recovered from the River Thames clearly demonstrates that it was possible to make stamps with cast designs (Photograph 68a-b).

The short-cuts which the late fifteenth century binder introduced as part of his overall approach were considerably earlier than one may have expected. For example, tanned as opposed to tawed thongs were in use within the first twenty five years of the invention of printing with movable type. Examples were noted as early as 1475 and in growing numbers throughout the 1480s until by the 1490s, the tanned thong started to dominate. By the 1490s, the first appearance of the headband can be seen in association with back cornered boards, as opposed to the laced-in endband. The sewing of books is altered, with comparatively little use of the herringbone link and with a consequent increase in all-along sewing, sometimes in the presence of packing. There was also a tendency to use straight lacing routes as opposed to convergent routes, in which channels share the same pegging hole. In the case of the printed book, however, this is not always true. These years were a time of tremendous change, in response to the tidal wave of books from the printing presses. That bookbinding was much in demand in the late fifteenth century has been well established. Parliament even relaxed the rules allowing bookbinders to immigrate to England when other trades were expressly excluded through the gild System. The use of foreign practices is all too apparent and the influence of émigré binders can be detected in the work of the Lily binder, with his uniquely interesting pink plaited endbands in tawed skin and other Germanic characteristics. More interestingly, we can detect the distinctly Bruges origins of Caxton's binder in his use of tawed supports in very small lacing channels combined with his unusual (for England) sewing route. However, we must be careful not to be misled by isolated evidence. Nicolas Barker's proof that the famous Scales binder was an English binder, working in England, writing in English, yet using Germanic decorative cut leather work, German style plaited endbands, occasional beech boards and other alien practices, is a clear warning (Barker 1972p.356-379).
Given the many exceptions described, books of the early fifteenth century do exhibit a great sense of tradition in terms of structure. The rare lacing of the Peterhouse MS. 144 demonstrates that in the early half of the century binding remained firmly routed in traditions, which in some cases may have had their origin more than two centuries previously. As stated previously, it would be wrong to describe such a bookbinding as having an archaic structure, because this is the work of a craftsman who had obviously studied and understood the concept of tunneled boards, and who had chosen to employ this approach for very sound reasons. In isolation, the book seems very strange, but we have no way of knowing how many books were bound in this way (save that a few other examples have come to light). The inherent conservatism of the early fifteenth century bookbinder is reflected in the making of books like the Peterhouse example, as well as the many other examples of oak boarded tawed bindings observed in the survey. It is accordingly all the more important, in this context, to draw attention to a remarkable fifteenth century example which looks firmly backwards (in its techniques) i.e. demonstrates what precedes and what follows. The example looks backwards in its choice of covering material, in its use of large lacing channels and in its excellent sewing structure, but forwards in its outward shape and decoration (i.e. Corpus Christi College, Cambridge, EP.H.1). Both the Peterhouse and Corpus books serve to remind us that whilst change was clearly evident, there remained a continuity and conservatism of technique throughout the period. Only when books with blind stamped tooling on tanned calf skin appeared, do we see the fundamentally traditional values and techniques being challenged. It is therefore hardly surprising that when the real effects of the printing press were felt in the late 1520s, an apparent and creeping decline in book structures became a revolution in binding practices, which effectively lost sight of the medieval binder's original concept of how a book should be put together.

Many paradoxes will have been observed in this study of fifteenth century books; it was as if the traditionalists only reluctantly, and with frequent backward glances, responded to the demands of a new age; in the final
analysis this thesis suggests that during the fifteenth century bookbinding in England was in a state of flux and tension as it struggled towards a reconciliation of the medieval craft traditions of the manuscript age with the phenomenon of mass book production. It is true that some provincial bookbinders in the early decades of the sixteenth century continued to produce bindings which echoed the practices of their medieval counterparts, but by then they were a dying breed, the modern book structure with its scant sewing and glued structure was born, and inferior techniques and materials had emerged as the main characteristics of the modern codex.
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