Making an English Bestiary: An Examination of the Tradition and a Modern Experience of the Technical Aspects of Production

Pamela S. Rups

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MAKING AN ENGLISH BESTIARY: AN EXAMINATION OF THE TRADITION AND A MODERN EXPERIENCE OF THE TECHNICAL ASPECTS OF PRODUCTION

by

Pamela S. Rups

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Submitted to the
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Second, special thanks go to conservator Jack Thompson and binder Jim Croft for their enormously generous contributions of time, patience, and materials as well as for teaching me things I thought I could never do. Jack’s generous support continued long after the workshop and included many magical goodie boxes and much moral encouragement. Thanks also to Rick Cavasin, who spent many hours not only giving me information, but also in making especially excellent vellum.

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Thanks also go to the administration of Waldo Library for allowing me to have an exhibit on the tools, techniques, and ingredients I have learned about in order to make my own bestiary.
Acknowledgments—continued

And finally, I could not have done this without the love and support of friends and family who didn’t forget me through the many months of social isolation it took to create my bestiary.

Pamela S. Rups
MAKING AN ENGLISH BESTIARY: AN EXAMINATION OF THE TRADITION AND A MODERN EXPERIENCE OF THE TECHNICAL ASPECTS OF PRODUCTION

Pamela S. Rups, M.A.
Western Michigan University, 1997

My thesis involves the compilation of information on the physical characteristics and production methods of English Bestiaries in the late twelfth and early thirteenth centuries as well as the actual production of my own Bestiary. Working with microfilm copies of six manuscripts, color slides and illustrations, and color reproductions of the miniatures of a seventh, I will examine and compare briefly the images, paleography and sources for the purpose of analyzing aspects of production.

Along with this written analysis I am producing my own Bestiary using authentic materials and methods as much as possible. I am limiting my own manuscript to include, for the most part, only those items in the original Greek Physiologus where they appeared in the later English Bestiary tradition. This exploration of the practical aspects of production has produced a reference bibliography on manuscript production techniques and a record of my own experiences for use in research on medieval book production.
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CHAPTER I

INTRODUCTION

The Scope of This Study

This project seeks to bring together the many practical aspects of medieval manuscript production. The project has two parts: (1) a paper in which various aspects of manuscript production are discussed, using six English Bestiaries as models; and (2) an abbreviated Bestiary made using authentic techniques and materials whenever possible, since I believe a solid knowledge of practical issues can only be obtained through encountering them firsthand. The physical properties of a manuscript contribute useful information to a broad range of other issues, including monastic life, economics, and manuscript origin. I am limiting myself to English Bestiaries because materials, binding styles, painting styles, and letter forms differed from country to country, and without a close focus, the topic would be too broad to cover. Also, English Bestiaries existed during the transitional period of binding I wished to examine, namely, the late twelfth century through the first half of the thirteenth century.

The six manuscripts I am using as the basis for my study are dated between 1185 A.D. and 1260 A.D., and my study of them was through microfilms unless otherwise indicated. The manuscripts are as follows:

1. New York, Pierpont Morgan Library M 81, c. 1185 A.D.

2. St. Petersburg, Saltykov-Shchedrin State Public Library MS Lat. Q.v.V.I, c. 1190–1200 A.D.¹


4. Oxford, Bodleian Library MS Ashmole 1511, c. 1210 A.D.

5. Oxford, St. John’s College MS 61, c. 1220 A.D.


I am also using the color miniatures from Oxford, Bodleian Library MS Bodley 764, c. 1240–50 A.D. in my analysis of the miniatures.

History of Bestiaries

“Physiologus” Tradition

Bestiaries are a mixture of perceived fact, myth, tradition and imposed religious ideology. The Church used the mystery, fear, and familiarity surrounding the animals in bestiaries as good and bad moral examples for teaching Christian doctrine. Bestiaries have elicited various reactions from scholars and readers through the ages. At one time they were “among the most popular and important of Christian didactic works,” according to McCulloch. M. R. James, writing in the first quarter of this century, found, however, that “its literary merit is nil, and its scientific value . . . sadly meagre.” It seems strange that a man such as James, known not only for his scholarly

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2Millar, Eric George, A Thirteenth Century Bestiary in the Library of Alnwick Castle. Oxford University Press, Oxford, 1958. This book, which I have examined in microfilm, includes an analysis of the manuscript followed by photographs of only those pages of the bestiary on which there were miniatures.

3Barber, Richard, Bestiary: Being an English Version of the Bodleian Library, Oxford M.S. Bodley 764 With All the Original Miniatures reproduced in Facsimile. The Boydell Press, Woodbridge, 1993. This book contains full-color reproductions of all the miniatures in the manuscript. Although the text has been translated into English, the miniatures are placed on the page in the same position they were in the original manuscript.


5As quoted by: Hassall, A. G. and Dr. W. O., Treasures from the Bodleian Library, Columbia
work but also for his numerous tales of the supernatural, would take such a scornful view of a literary form that was not meant to be scientific in the modern sense to begin with. Colin Clair quotes St. Augustine as writing: "The important thing for us is to consider the significance of a fact, not to discuss its authenticity." And as Guy Mermier explains:

These texts were written primarily to teach, explain and inspire, to fight the forces of evil, to point to the sneaky tricks of the devil and to invite all men to join forces through Faith against the temptations of God's enemy. They invited the Faithful to ponder on the strength of God, on the sacrifices of Christ and on the duties of every Christian man and woman. Whether real or fabulous, the animals of the bestiaries served a common purpose: to save all good Christians and to warn or lose the unfaithful.

The original work on which all subsequent forms of bestiaries are based was the Greek Physiologus, a work of forty-nine chapters, each dealing with an animal, bird, insect, fish or, strangely enough, stone. "Physiologus" is the name used for both the otherwise anonymous authority cited in the text as well as for the text itself. "Physiologus," which means "naturalist,"

...was probably originally used to indicate the pagan author of a work in which were found characteristics of various animals, and only later was the name applied to the book itself. When the allegories were added by a Christian writer, they influenced both the final choice and the description of the contents.

Written probably in Alexandria in the second century A.D., the Physiologus drew together the "widespread heterogeneous folklore of the Eastern Mediterranean," according to Eden. The later Christian author apparently found in the non-human world evidence of scriptural teachings and lessons for Man, and so added to the pagan


McCulloch, p. 19; McCulloch here gives the opinion of Friedrich Lauchert (Geschichte des Physiologus, Strassburg, 1889, p. 4), which is supported by other scholars.

work for the original Greek Physiologus. Chapters typically begin with a Biblical quotation and continue with, "Physiologus says," and the animal and its characteristics are described. The account proceeds with perhaps more Bible verses and an allegory featuring the animal.\(^\text{10}\)

The Church Fathers found this an appealing method for spreading Church moral teachings, the first citation mentioning Physiologus being in Justin Martyr (d. circa 166 A.D.), with other references occurring in Tertullian and Origen. Physiologus became so popular that by the fifth century it had been translated into the vernacular languages of people in the Greek Church. There seem to be two main Greek versions from which all subsequent Latin manuscripts were derived, a short one containing twenty-six chapters and a longer one containing forty-nine chapters\(^\text{11}\) (listed in the Appendix A). A definite date cannot be established for the first Latin translation, but evidence of Ambrose having copied some of the description of the Partridge in his Hexaemeron (vi.3.13) shows one could have existed in the late fourth century.\(^\text{12}\) More definite evidence for dating an early Latin translation was thought to have been in the Decretum Gelasianum of Pope Gelasius from the Council of Rome in 496 A.D.\(^\text{13}\) However, more recent study of this document indicates it is not authentic.\(^\text{14}\) The main Latin bestiaries in England derived from the version known in bestiary studies as Versio B and represented by the eighth- or ninth-century manuscript B (Bern, Lat. 233, f. 1–13).\(^\text{15}\) By the thirteenth century, English bestiaries had become very popular and had added information from Pliny the Elder, Isidore and Solinus until most had more than one

\(^{10}\)McCulloch, p. 16.
\(^{11}\)McCulloch, pp. 16–17.
\(^{12}\)McCulloch, pp. 20–21.
\(^{13}\)McCulloch, pp. 19–20.
\(^{15}\)McCulloch, p. 25.
hundred chapters.\footnote{McCulloch, pp. 37–38.}

Several things could account for the growing popularity of bestiaries in the twelfth and thirteenth centuries. There is evidence that bestiaries were a source for sermons in the Middle Ages. According to Klingender, in the early twelfth century, Honorius Augustodunensis used some of the allegories in his collection of sermons \textit{Speculum ecclesiae}, for use primarily by parish priests.\footnote{Klingender, Francis, \textit{Animals in Art and Thought: To the End of the Middle Ages}, M.I.T. Press, Cambridge, 1971, p. 342.} Klingender also suggests that the popularity of the bestiaries grew out of the humanist movement of the early twelfth century when scholars, returning to classical sources, found joy and beauty in the natural world. The first poems of nature and love were written by these scholars in Latin and inspired poems on the same themes in the vernacular. During the twelfth and thirteenth centuries, there was also a scientific revival, encompassing the recovery of information from Antiquity, which was enlarged by contemporary observation and experimentation in western Europe.\footnote{Klingender, pp. 343–44.} The symbolism of the animals, fish and birds in bestiaries became so important in the tradition of miniatures in manuscripts that it continued on past the thirteenth century in other forms of art.

One thing that is not clear from my reading is the difference between a \textit{Physiologus} manuscript and a bestiary. Eden has this explanation:

\begin{quote}
It was primarily Versio b which served as basis when an important innovation was made in the shape of the \textit{Physiologus}. Not later than the eleventh century, and probably at least as early as the ninth, a new recension was made, probably in France, which came to be attributed to Johannes Chrysostomus, Patriarch of Constantinople early in the fifth century. The innovation was the reduction of the number of chapters by omitting the sections dealing with vegetables and minerals, and by arranging the “animantia” in the order quadrupeds, reptiles, birds. Hence was produced the first “Bestiarium” proper, Versio I of the \textit{Physiologus}. In the MSS it goes under the title \textit{Dicta Johannis Chrysostomi de naturis bestiarum}. \ldots \footnote{Eden, P. T., \textit{Theobaldi “Physiologus"}, E. J. Brill, Leiden, 1972, p. 3.} \end{quote}
Eden then goes on to say that the "Dicta" were not popular in England,²⁰ but I have noticed that English Bestiaries do, for the most part, follow the reorganization into quadrupeds, reptiles, and birds, although not necessarily in that order. Curley makes the distinction at a slightly later date, writing, "By the end of the twelfth century a new form of popular nature-book had developed under the generic name of "the bestiary" which, in keeping with the encyclopedic taste of the period, tended to absorb virtually all animal legends, including those of Physiologus, into its pages."²¹ McCulloch writes that "the nature of the old Physiologus changes sometime during the twelfth century... The number of chapters in what is now properly called the bestiary is far more than doubled, with most additions coming from Isidore."²² She indicates the change begins with James’ Second Family, which would exclude such transitional manuscripts as the Morgan, St. Petersburg, and Alnwick Castle books. These manuscripts, though, are already organized by classification, which would seem to indicate they have made the transition to bestiary form. On the other hand, McCulloch seems to use the terms interchangeably, as in this excerpt: "One probably wonders how the Physiologus or bestiary, a work now regarded as most certainly anonymous...";²³ and Mr. David Diringer refers to the Physiologus as the "Greek Bestiary."²⁴ This would seem to indicate the terms are used somewhat interchangeably, at least in certain circumstances. My reading indicates that "bestiary" is used for either any book about animals or those later manuscripts in which the subjects were organized by categories. Physiologus, though, always refers to the early original writing in Greek or Latin translation, before it had many additions and was organized into categories.

²⁰Eden, p. 4.
²¹Curley, Michael J., Physiologus, University of Texas Press, Austin, 1979, p. xxx.
²²McCulloch, pp. 34–35.
²³McCulloch, p. 30, footnote 32.
Classification by Content

M. R. James has divided the large number of English bestiary manuscripts according to content into four main categories called Families. Since James’ schema is widely used, most likely because it is fairly simple and comprehensive at the same time, I will refer to it in this paper. A list of the English manuscripts and the Families to which they are attributed appears in the Appendix C.

In the manuscripts of the First Family, the Physiologus portions of each chapter are usually supplemented with passages taken from Isidore’s Etymologiae. The number of chapters, ranging from twenty-eight to forty, was not increased and the arrangement of the chapters was still unorganized into categories.

The manuscripts of the Second Family, about twenty-two, supplement the Physiologus and Isidore texts with additions from Solinus’ Liber memorabilium, the Hexaemeron of St. Ambrose, De Universo by Rabanus Maurus, Pantheologus by Peter of Cornwall, Avarium by Hugh of Folieto, and/or Topographia Hibernensis by Giraldus Cambrensis. The incipit for this group of bestiary manuscripts is either “Leo fortissimus bestiarum ad nullius pavebit occursum” (Proverbs 30:30 as cited in De Universo [VIII.1] mentioned above) or “Bestiarum vocabulum proprie convenit pardis. . .” (Isidore, Etymologiae xii.2.1). There are usually over one hundred chapters in these manuscripts which are now organized into a logical sequence of beasts, birds, fishes and reptiles. This change seems to have begun in the twelfth century and continued for around two hundred years.

But early in the thirteenth century, a separate variation in the tradition began and

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26McCulloch, p. 35.
is represented in James' Third Family. The manuscripts begin with Isidore's description of fabulous nations (Isidore, *Etymologiae*, xi.3.1–39) and parts of Bernard Silvestris' *Megacosmos* and conclude with the Wheel of Fortune, *De remediis fortuitorum* of Seneca, the Seven Wonders of the World, and "Divination" from *Policraticus* by John of Salisbury. There are only four manuscripts representing this Family. The Fourth Family consists of one manuscript only (Cambridge University Library Gg. 6. 5) which is based on *De proprietatibus rerum* by Bartholomaeus Anglicus.

**Pictorial Tradition**

Bestiaries are probably most often thought of as picture books of fantastic beasts, yet not all were illustrated. None of the manuscripts based on the version attributed to the Italian Theobaldus, abbot of Monte Cassino from 1022 to 1035 A.D., had illustrations. Theobaldus' version is interesting for other reasons, too. It was written as a poem in mixed meters and is about three hundred lines long. It is much shorter than other *Physiologus* texts, dealing with only thirteen creatures: the lion, eagle, serpent, ant, fox, stag, spider, whale, sirens, onocentaurs (half man, half ass), elephant, turtle-dove, and panther. Another version of the *Physiologus*, referred to as "Versio B" by McCulloch, is the main Latin text from which bestiaries in England developed. It is longer than the one by Theobaldus, with thirty-six chapters, and also is not illustrated. In spite of both of these being among the most widespread versions, the lack of illustrations does not seem to have been carried over into English

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27McCulloch, p. 39. The "Wheel of Fortune" and "Seven Wonders of the World" do not seem to be specific works attributed to any author.
28A good overview of this and the other influential manuscripts mentioned in this paragraph occurs in Klingender, pp. 344–359.
29McCulloch, p. 71.
30McCulloch, p. 25.
31McCulloch, p. 25.
manuscripts. According to M. R. James, bestiaries, Psalters and Apocalypse manuscripts were the most numerous of the picture books in twelfth- and thirteenth-century England.\textsuperscript{32}

Since the original Greek \textit{Physiologus}, from which the earliest Latin version was derived, no longer exists, we can never know for certain if it was illustrated. Although the oldest Greek \textit{Physiologus} still in existence (Morgan 397, late tenth century)\textsuperscript{33} is not illustrated, the later Smyrna Codex was. The Smyrna Codex (about 1100 A.D.), unfortunately destroyed in a fire in 1922, was the earliest known and documented Greek text with illustrations.\textsuperscript{34} The subjects illustrated in the Smyrna Codex are similar to those in the Latin manuscripts.\textsuperscript{35} However, this manuscript portrayed not only the animals' physical features, but also illustrated the religious allegories associated with each one. The oldest illustrated Latin version, Versio C (Bern 318, ninth century),\textsuperscript{36} is unlike the Smyrna Codex, though, in that it shows only the characteristics of the animals and does not have illustrations of the allegories.

Although this evidence doesn't allow us to assume that the original Greek \textit{Physiologus} was illustrated, Weitzmann has written suggesting that the strong illustration tradition surviving in more durable objects, such as pottery, monuments, and plaques was related to Greek papyrus scroll illustration, which did not survive well because of its fragility. Of the surviving Greek roll fragments, Weitzmann writes that the scientific ones were illustrated earlier than literary works because explanatory drawings would have been necessary for comprehension. "Like the illustrations of the herbals and medical treatises, it is apparent that a certain group of animal pictures was invented in the Hellenistic-Roman period and then passed through various texts down

\textsuperscript{32}McCulloch, p. 70.
\textsuperscript{33}New York, Pierpont Morgan Library, M 397.
\textsuperscript{34}Smyrna, Library of the Evangelical School, B.8.
\textsuperscript{35}McCulloch, p. 72.
\textsuperscript{36}Bern, Burgerbibliothek, lat. 318, ff. 7-22v.
Unfortunately, we know of no illustrated eleventh-century manuscripts in the Latin Physiologus tradition. However, early twelfth-century versions that were illustrated do have line drawings or drawings with light washes set on the page with no background. Nigel Morgan describes this as being "... in the tradition of the normal form of Bestiary illustration rather than the new luxury painted and gilded versions. . . ." This would follow the early illustration tradition of Greek manuscripts that were done on papyrus and rolled into scrolls, according to Weitzmann, possibly suggesting a connection to an earlier Greek illustration tradition. Rolling the papyrus would have caused any thick application of paint to crack and flake off, as did indeed happen in some later Byzantine liturgical rolls. The later codex format, in which the pages stay relatively flat, was ideally suited to the heavier application of paints, so that the necessity to use line drawings and thin washes died out. The very simple line drawings with little detail in the Vatican Bestiary were, perhaps, from this earlier tradition. By the late twelfth and early thirteenth centuries, the bestiary manuscripts in England were at their peak, featuring many richly colored pictures in framed format with colored backgrounds and gold leaf, the frames being mostly either round or rectangular. So although we do not know if the original Greek Physiologus was illustrated, there is evidence supporting that likelihood.

The illuminations for each creature precede the corresponding text or are placed beside the text which opens the chapter. When there are two or more chapters about an animal, such as the dog in Bodley 764, the miniatures appear before the chapters they illustrate. To have the illustrations so systematically anchored to the text is a

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39Weitzmann, p. 83.
characteristic of a very early Greek papyrus scroll tradition. Weitzmann writes, “While in the preceding examples the first scene in a row remained anchored to the text passage proper, the next step was to dislocate the whole row of scenes, including the first one, and to place them in the text, wherever for mere formal reasons it seemed desirable.”

As an early example of the separation of text and illustration, Weitzmann discusses the Genesis fragment of National Library of Vienna, cod. theol. gr. 31 from the beginning of the sixth century. In this manuscript, all the pages were divided up with text on the top half and illustrations on the bottom, regardless of how the two elements were related. So the convention of consistently placing bestiary miniatures just before the appropriate text, wherever that happened to occur on the page, was an early one and could date from before the early sixth century, another possible support for an early illustrated Greek Physiologus tradition.

There are many variations within English bestiaries as to the content and size of the miniatures. The manuscript Bibliothèque Nationale MS fr. 14969 (c. 1265–70) contains not only pictures of the animals, but also illustrations of the moral lessons, often as contemporary scenes involving monks and friars. This meant that there were even more paintings than for just the animals alone, producing a very extensively illuminated manuscript. Beginning in the thirteenth century, introductory scenes, such as Adam naming the beasts, were often as large as a full page, and the illustrations of the lion were often also at least a full page containing three or four panels. Several other creatures are also often represented by large miniatures, such as the tiger, dog and horse, to name a few, but the size of the picture does not always indicate the importance of the creature. The dove and the turtle-dove in Bodley 764, for instance, both have fairly long passages about them and both are held up as positive examples, yet the

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40 Weitzmann, p. 89.
41 Morgan, pp. 110–112.
accompanying miniatures are only about one-eighth of a page large.

This is a very broad topic with many interesting aspects, but the discussion to this point must be general. I will discuss the particular miniatures in the manuscripts I am studying in more depth in the next chapter.
CHAPTER II

EXAMINATION OF SIX ENGLISH BESTIARIES

Paleography

General Discussion

No matter how carefully one writes, every person will make a letter differently each time he writes it. Even taking this into consideration, the study of the letter forms for the six manuscripts under consideration reveals that, except for slight individual quirks, the basic forms of the letters remained the same from 1185 through 1260 in England at the sites where they were produced (Table 1). I would grade the scripts as being English Gothic book script of the lowest grade and medium quality (littera minuscula gothica textualis rotunda libraria media), according to the specifications given by Michelle Brown.42 In spite of their similarities, however, a very definite personal style can be noticed from one scribe to the next. This is not always easily detected, especially at first glance, but through my studies of twelfth- and thirteenth-century manuscripts I have developed a system that works well, especially for those still developing a critical eye for letter forms.

In trying to distinguish the writing of one scribe from that of another, I initially examine two letters in particular as well as the use of certain other conventions. The letters that seem to take on the most quickly identifiable personal variation from scribe to scribe are the minuscule “g” and “h”. For the “g”, points to notice are the shape of the top bowl, whether the connection to the next letter is from the top or side.

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### Table 1
Comparison of Letter Forms in Six English Bestiaries

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<th>Pierpont Morgan Library M 81</th>
<th>S. S. State Public Library MS Lat. Q. v. I</th>
<th>Biblioteca Apostolica Vaticana MS Reg. Lat. 258</th>
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<th>Alnwick Castle Bestiary MS 447</th>
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of this bowl, the shape of the tail, and whether the tail is closed or open. One of the places for variation of the “h” occurs at the top of the ascender, which, in the manuscripts under consideration, is either serifed or thickened. The bottom of this ascender has a slightly different stroke from scribe to scribe, too. One of the most quickly noticeable variations in the “h” is how far back to the left the scribe pulls the downstroke on the limb. A quick search of each page for these two letters, comparing them throughout a manuscript, will usually give a fairly accurate indication of whether more than one scribe has worked on a manuscript.

Other things to consider are the use of two versions of the same letter, except for “s,” which occurs fairly commonly in the tall and the rounded versions for most scribes. The way a scribe uses or doesn’t use capital “R” at word endings can be an identifier just as with the upright “d” and the uncial (slanted-ascender) “d.” This uncial “d” seems to be an awkward letter for many scribes and thus often does not have as consistent a shape as most other letters. The angle of the ascender often varies greatly in one hand as does the size of the bowl. Another identifying trait is whether the ampersand or the tironian “et” symbol is used exclusively, or if they are both used, and in what situations. It is typical for this grade of gothic to have the uncrossed tironian “et” symbol, but it is crossed in the Alnwick Castle Bestiary.

The angle at which the pen was used can also be distinctive. The quill was cut so that it had a broad flat surface to give thick lines when pulled in one direction, and thin lines when pulled or pushed 90° to this. The angle at which the pen was held in relation to the horizontal baseline on which the letters sit can be found by drawing a line parallel to the thin lines, such as in the “e,” “a,” “o,” “m,” and “u.” The angle of thin strokes at the terminus of letters, forming what we today call serifs, can be found in the same way; these strokes are often made at a different angle from that used to form the letters themselves (Figure 1). How a letter was formed, the number of strokes, and in
what direction they were made is usually fairly easy to determine. Thin strokes can be made either upwards

or downwards at an angle, while broad strokes are almost always made downwards or sideways but usually not upwards. Quills are quite flexible and become more so the longer ink is on them. Pushing the broad part of a springy quill upwards on a writing surface can result in a ragged stroke or spattered ink. Letters are generally formed by downwards strokes and from left to right (Figure 2).

Table 1 compares examples of each letter as well as some symbols and two or more capital letters for all six manuscripts. A quick comparison of the letters “g,” “h,” “r,” and “d” along with the occurrence of the ampersand or tironian “et” will show how definite the difference is from scribe to scribe. In cases where more than one

![Diagram showing pen angle and formation of thick and thin lines.](image)
scribe worked on a manuscript, several samples are given.

My studies show that the text of each Bestiary was written by a single scribe with the exception of a few lines inserted later at the bottom of one folio in the St. John's College manuscript (f. 5).\textsuperscript{43} This does not include passages preceding or following the Bestiary itself, and is only a fairly cursory observation since I did not make a detailed study of each manuscript page by page. Texts appearing before and after the Bestiary proper could have been inserted at a later date and, such as in the beginning and end of the Morgan manuscript, were often written in more than one hand. Such evidence would indicate that the work procedure at this time in England was to let a single scribe write an entire manuscript, probably from a bound volume,

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{figure2}
\caption{How Letters are Formed With a Broad Pen.}
\end{figure}

\textsuperscript{43}The Sotheby's catalogue in which the Alnwick Castle Bestiary is described states that another scribe might have begun writing around f. 63 or f. 64, which would be the beginning of the last quire, but this is after f. 60, on which the last animal occurs, and was not on the microfilm I used for my studies.
rather than to divide the various gatherings from a manuscript among several scribes for quicker simultaneous copying. It also suggests that speed of production was not an issue, in which case the early Bestiaries in this study were probably not made in one of the lay production houses that began springing up around this time to produce highly illuminated books for rich persons. This does not, however, rule out a lay scribe doing the work for a monastery.

Since the Pierpont Morgan manuscript has definitely more than one scribe contributing to the leaves that precede the bestiary itself, that section will be analyzed in detail. The following discussion of the letter forms of its five scribes serves also as an examination of the hands of the time and gives details I noticed that contributed to how I chose to write my own Bestiary.

The Pierpont Morgan Bestiary Scribes

I have identified the hands of five scribes in the Pierpont Morgan Bestiary. The alternation of these five hands occurs only in the seven folios of preliminary material presented before the Bestiary itself. The passages chosen for this section vary from manuscript to manuscript, and often include The Creation and Adam Naming the Animals, as the Morgan Bestiary does. Because there are five scribes contributing to this section, it could mean these passages were done at a different time from the rest of the Bestiary or at least out of order from the rest of the manuscript. Perhaps the main scribe was not available to write all the passages due to illness or some other interruption.

It is difficult to determine absolutely whether there are indeed only five scribes or possibly more, because some of the writings are limited to one page or less, and thus contain very few examples of letters that would definitely point to an individual hand. But I am convinced from this initial examination that five scribes participated in the
preliminary section. Also, several lines of each example are cramped, as if the writers were trying to fit a fixed amount of text in a specified space, usually one page. Indeed one scribe exceeds the end of the allotted text area by a line and a half in spite of writing smaller and more cramped beginning six lines above the end (f. 4v). This cramped writing can make it difficult to judge against a normally written passage.

The writing of the five scribes in the Pierpont Morgan Bestiary is not quite in sequential order. The manuscript begins in the hand of Scribe A (Figure 3) on f. 1v with a passage stating that the book was given in 1187 to the Augustinian priory of Radford (Radeford in the MS) by Philip, a canon of Lincoln. This means the manuscript had to have been completed for the donorship inscription to be written and that the text on folio 1v was written after the rest of the Bestiary. It could even mean the
first few folios were added at a later date than the main part of the Bestiary.

Scribe A on folio 1v has a hand that, at times, tends to slant slightly to the left of a line perpendicular to the baseline. The slant is most consistently about -3.5° but can be as much as -5.5° (see angle diagram in Figure 3). Most scribes attempted to achieve a hand that was as close to perpendicular as possible, which became an integral part of the pattern of later gothic hands developed from those being presently examined. For most of the first half of folio 1v, Scribe A has condensed and decreased the size of his letters as if he feared his passage would run over the end of the page. As it is, he ends up with a line and a half left free. This narrowing of the letters makes it difficult truly to judge the letter forms, but I feel I have found enough characteristics to identify the hand well. It has an overall look of inconsistency, with the height of letters varying even within a single word. The page does not have a pleasing flow to it and the letters do not present the look of having been formed carefully. Many of these deficiencies could very well be due to when the passage was written. I have already suggested that this text was written after the Bestiary was completed. Thus the manuscript was very probably already sewn together if not also bound onto boards, making writing more difficult than would normally be the case and giving the writing its poor appearance. Haste could also account for the shoddy penmanship.

Let us first examine the minuscule “g.” The tail stroke begins with a strong pull to the right, and goes down to a rather horizontal stroke at the bottom. It is then usually closed with a thin stroke. The “s”s on this page have a serif on the bottom end sometimes. In the one instance when the letter occurs at the end of a line (next to last line), the top extends to the right with a flourish. Scribe A favors the tironian “et” with a definite upward thin stroke to begin the symbol. With one exception, this symbol is written as large as the majuscule letters, which is uncommon and not done by any of the scribes in the Bestiaries under consideration. The “h” tends to be thickened at the
top and the downstroke of the right limb has a flat rather than rounded side to it. The upright "d" has a thickened top and the uncial form is very inconsistent in the method of forming the slant and the angle at which it occurs. The "l" and "b" also have the thickened top and top-heaviness of the "d" and "h," and the "p" and "q" also finish with a thick blunt stroke.

Scribe B (Figure 4) writes folio 2r, which contains two texts, "De forma mundi" and "De creatione mundi," each beginning with a title in red. The upper and lower parts of Scribe B’s letter "g" have almost the same width, making this letter narrower than that of Scribe A, who makes the bottom portion of the "g" wider than the top. Especially when compared to those of Scribe A, all the letters appear somewhat narrower and more consistent in height. The "s" has no serif added to the termination of the top or bottom loop and the rounded "s" occurs only as a majuscule. The letter "h" has the down stroke on the bowl extending well beyond the baseline. Minuscule "d" letters are of two types, more common is the type with a vertical ascender. These letters usually have a thin stroke off the left side of the tops of the ascenders. There are also
several of the uncial type of “d,” remarkable in that they are more than typically consistent in their formation. The tops of the ascenders on the “l” and “b” and “h” are thickened, but the termination of the descenders on the “p” and “q” tend to be thin strokes.

A third scribe, Scribe C (Figure 5), fills folio 2v with a text headed “De etatibus mundi.” The hand is regular and mostly upright with a slight slant to the right at times.

Figure 5. Morgan Bestiary, Scribe C, f. 2v.

The most distinctive aspect of this scribe’s writing is the way that vertical strokes end horizontally at the baseline. Since most of the writing requires the pen to be held at about a 45° angle, this means the scribe must twist the pen clockwise slightly for the stroke to end horizontally, something found later sometimes in Gothic letters. This scribe tends not to close the bottom half of the “g” and he adds thin strokes to both terminations of the majuscule “S.” Such thin strokes are also found on the tops of
ascenders and the bottom of descenders, but they are at a pen angle much shallower than 45°. These are also longer than for the writing of the other scribes, especially on the “d.” The last letter in the last line of this passage is the first example of the use of the majuscule “R” used at the end of a word. It is used only at the end of words, not internally, and Scribes D and E also use this convention.

Scribe A resumes the text on folio 3r with “Igitur perfecti sunt . . . ” and continues to the end of folio 4r. Among the characteristics most readily noticeable as similar to the script of folio 1v are these: there is still an occasional tendency for a slight leftward slant to “d”s and “p”s; there is inconsistency of the size of letters even within a single word; the “g” has a flat bottom. Other peculiarities mentioned earlier as being characteristic of Scribe A also appear on these folios. The one big difference is that in this section the scribe uses the ampersand instead of the tironian “et” symbol. The tironian “et” does occur once, on folio 4r in the middle of line 10, and it has the distinctive thin stroke at the beginning just as on folio 1v. In spite of the fact that this passage uses the ampersand almost exclusively instead of the tironian “et,” all the other characteristics found in the hand of Scribe A are shown in this passage and I therefore ascribe it to Scribe A. It is quite possible that the scribe simply underwent a change in habit. Another possibility is that the text from which he was copying used ampersands and he adhered to that convention, but when left to write the original text for the donation of the manuscript, he reverted to his own preference for the tironian “et.”

In this subsequent appearance of the hand of Scribe A, the letters do not have as strong a tendency for a leftward slant as on folio 1v. However, the similarities between the two hands are strong enough in all other respects for me to say they were written by the same person. It is my opinion that the examples do not appear in the order in which they were written. The fact that the second passage does not have the strong leftward slant points to it having likely been written in the normal course of production, which
means the folios would not have been folded and sewn up, but would have lain flat for normal writing. The manuscript having been bound by the time the donation inscription was written would make writing more difficult and could have resulted in the awkward slant of the first example.

Folio 4v is written by Scribe D (Figure 6). This is a fairly even and upright hand, well spaced until seven lines from the bottom, beginning “Adam primus . . .”, where the scribe begins writing in a smaller, more cramped fashion, in order to try to fit

facendā mañet fut. Eōa intiprē.

\[ g g g \]
\[ s s s \]
\[ r \ r \ r \]
\[ h h h h \]
\[ a a a a \quad v v v v \]
\[ l l l b b b b \quad p p p p \quad q q q q \]
\[ r \quad m m m n n n n n n \]

Figure 6. Morgan Bestiary, Scribe D, f. 4v.

the remaining text on the page. In spite of this, he still has to add a line and a half after the lower double ruling on the page. The “g” is very similar to that of Scribe C, but the ascenders of Scribe D lack the long serifs of Scribe C. The bottom of the “h” is pulled down and back even farther than by Scribe C, and the bottom of the ascender of this letter ends differently for the two scribes. Scribe D ends many of his downward strokes
with little "feet," whereas Scribe C doesn't and ends his strokes horizontally. Scribe D is not as consistent in forming the uncial "d" as Scribe C, but like this scribe, he does use the majuscule "R" at the end of a word for passive verbs.

It has been suggested to me that the "Adam primus . . ." section mentioned above could have been written by another scribe. This is the beginning of a new section with a red "A," and the letters do look different from those written before it on the same page. But I feel they are the work of the same scribe and that this last section is simply a cramped version of his earlier writing. The bottom of the "h" is pulled down and back in the same manner and the letter "p" has the same shape and serif on the bottom of the descender in both parts.

The main scribe for the Pierpont Morgan bestiary begins writing on folio 5r. It should be noted that although folio 5r starts at the beginning of a sentence, there appears to be preceding text missing. Since the collation of folios 1–7 is a gathering of four leaves and another gathering of three leaves, it would seem that a folio is probably missing between folios 4 and 5. Scribe E (Figure 7) has a round, open hand that is fairly regular in appearance. This scribe's "g" has a more open upper part with the lower part being rounded and closed, but slightly wider. Scribe E uses the minuscule rounded "s" more frequently than the other scribes and uses the ampersand almost exclusively. The body of the "h" is rounder than for the other scribes and does not tend to extend much beyond the baseline. The descenders of the "p" and "q" end with a thin stroke, which is at a very shallow angle and is often horizontal. The most noticeable characteristic of this hand, however, is the frequent use of the uncial "d" and its formation. The ascender usually begins with a downward thin stroke at a 45° angle, something none of the other scribes does. Scribe E continues from the top of folio 5r through the rest of the manuscript.
A detailed discussion of the miniatures and texts of the six bestiaries would be too vast for this paper and its purpose if not limited to aspects related only to manuscript production. Studies in more depth on both the text and the miniatures for certain manuscripts have already been written, as well as discussions of the animal imagery. For this paper, I have confined myself to the paleographical aspects of the manuscripts, which have been discussed above, the order of the bestiary subjects (which includes both miniatures and text, since they are inseparable), and general

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44Some of those sources: James, Montague Rhodes, The Bestiary, Oxford University Press, Oxford, 1928; McCulloch has an extensive analysis and comparison of both text and miniatures; Millar compares each miniature in the Alnwick Castle Bestiary to those in the Morgan and British Library Royal 12 C. XIX; a wide variety of bestiary papers is presented in Beasts and Birds of the Middle Ages: The Bestiary and Its Legacy (Clark, W. and McMunn, M., ed.); Klingender presents an extensive study of animal images up through medieval times.
observations on the appearance of the illustrations and how they were produced.

The Order of Bestiary Subjects

Table 2 compares the order of bestiary subjects for seven English Bestiaries. I have attempted to list the subjects in a manner that would make it more obvious which sections share a similar order in more than one manuscript. Dashes do not mean that a subject has been lost, but only that it does not appear in that manuscript. Missing subjects have been designated as such. Spellings may vary, especially when the subject is imaginary and the name is in Latin. Most subject names have been given in English. A similarity in the order of the subjects can mean that the texts are also alike, but it does not necessarily mean that the miniatures are similar, too. A very good example of this is the relationship between three manuscripts, the Morgan, the St. Petersburg (S.-S. State Public Library), and the Alnwick Castle. Table 2 shows that the three manuscripts share an almost identical list of subjects and thus share a textual tradition. The relationship of the manuscripts with respect to their miniatures, though, is rather different. The Morgan and the St. Petersburg miniatures are basically identical, even in the respect of placement on the page. The figures even have identical poses; only the style of painting and some small decorative elements are slightly different. The miniatures in the Alnwick Castle manuscript have some similarities to those in the Morgan and St. Petersburg, but they also vary in many ways. The styles of painting are quite different, the earlier two manuscripts having bright and often solid colors and a great deal of gold, whereas the later Alnwick Bestiary uses line drawings and washes. The illustrations themselves differ in degrees of similarity to each other; some, like the lion and the hedgehog, are very different; others, like the hyena and the hydrus, differ only in small details; still others, such as the satyr, are essentially identical.
Table 2

Comparison of Text and Miniatures in Seven English Bestiaries

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Three other bestiaries also have a strong similarity as shown in Table 2: the Ashmole 1511, the St. John's, and the Bodley 764. In fact, all six of the manuscripts discussed so far in this section show a great similarity from the dragon and basilisk to the ends of the manuscripts. The table also makes it very obvious how different the Vatican Bestiary is from the other six. And, indeed, the miniatures are also not alike. Although they are line drawings, and in that respect would be similar to the illustrations in the Alnwick Castle manuscript, they are not framed, lack much detail, and most do not even have a colored wash, as in the Alnwick Bestiary. The images are not similar to those in the other six bestiaries and they have no gold in them. The Vatican Bestiary has another big difference in that it is followed by a lapidary. Stones appeared in the original Greek Physiologus, but at some point they disappeared from the tradition with the exception of the firestones, which are included in many, but not all, of the twelfth- and thirteenth-century English bestiaries. Two other English bestiaries from this period are also followed by a lapidary: Cambridge, University Library MS ii.4.26 and Cambridge, University Library MS Kk.4.25.

Pricking and Models for Miniatures

Since the bestiary tradition was passed on, there is the question of whether there was a model book for its production. As the early simple line drawings with washes became brightly-painted framed and illuminated miniatures, the bestiary manuscripts also increased in popularity and rate of production outside monasteries. The Harvard College Library has a manuscript that has been determined to be a later thirteenth-century model book for bestiaries.\(^4^5\) This would coincide with the time at which a lay production house could have produced multiple copies during the period of bestiary

popularity. There are two sections to the model, the first containing 75 miniatures, mostly of birds, and the second containing the bestiary text, with spaces left for miniatures. Since the miniatures have been pricked, as described below, it can be presumed that they were used as guides for copies. Unfortunately, though, manuscripts have not been found with corresponding miniatures in them, although examples used in other model books, such as the Göttingen Model Book, can be directly traced to existing manuscripts.46

It cannot be determined exactly when model books for bestiaries began to be used, but that a workshop or scriptorium had some sort of collection of images to work from as early as the Aberdeen and Ashmole Bestiaries (circa 1200–1210)47 is argued by Muratova.48 She cites the many examples of like images from mosaics in Sicily, southern Italy, and San Marco in Venice appearing in English miniatures. Muratova also states that the use of images from other iconographic traditions is evident from the fact that the Creation miniature in the St. Petersburg Bestiary, the first known bestiary to be prefaced by this scene, includes hares, as do both the Aberdeen and Ashmole manuscripts. These could not have been done without some sort of example for reference since hares appear to have been unknown in England before the thirteenth century.49 It would also appear from the closeness of the Aberdeen and Ashmole Bestiaries and the pricking in the Aberdeen Bestiary that finished manuscripts themselves were used as models for subsequent work. McCulloch also notes that "the outlines of many of the drawings in B.M., Add. 11283, early twelfth century, are

49Muratova, "Workshop Methods in English Late Twelfth-Century Illumination and the Production of Luxury Bestiaries," p. 57.
pricked, and several, though not all, of the illustrations appear to have their counterpart in Brussels, Bibl. Roy. 83409 of the fourteenth century,\textsuperscript{50} so pricking occurs in other bestiaries, too.

It has been shown that bestiary miniatures were often copied from one manuscript into another, just as texts were. One of the methods of copying illustrations was to prick through the original in many places onto a separate piece of vellum, which would serve as a template, or perhaps directly onto the page of the new manuscript. The prickings would serve as a guide and would be connected with light ink or lead lines to complete the outline for the miniature painter to follow. Hellmut Lehmann-Haupt has also determined that a method called pouncing was also probably used.\textsuperscript{51} Pouncing is accomplished by placing the pricked template over the place where the miniature is to appear in the new manuscript. A small cloth bag containing powdered charcoal or colored pigment was then rubbed over the template, forcing the powder through the pricked holes and onto the fresh manuscript page. This would give the artist a series of dots to connect for the outline of the images. The reason for the intermediary template was to preserve the original drawing from being rubbed or spoiled by the colored powder.

What was so amazing to me was to see the way the pricking was done. The holes are very close together, almost like the perforations on a postage stamp.\textsuperscript{52} This would not have left much up to the skill of the artist connecting the dots, so outlining a transferred image was a step that could easily have been left to a beginner. But the question also arises as to whether the holes are from a single pricking or from multiple sessions.

\textsuperscript{50}McCulloch, p. 75, footnote 17.
\textsuperscript{52}Ives and Lehmann-Haupt, Fig. 8, back of book.
The Aberdeen and Ashmole Bestiaries are considered sister manuscripts which were probably produced at the same workshop.\textsuperscript{53} The Aberdeen manuscript, considered the earliest extant luxury bestiary of James' Second Family, shows evidence of much pricking and could very well have been used as the main manuscript from which many other copies were made.\textsuperscript{54} In fact, an earlier bestiary, dated by Kauffmann to around 1170 and having unframed pen drawings, also has several miniatures that were pricked.\textsuperscript{55} This does not mean the Aberdeen was a model book with exemplars, for it is a fully finished manuscript, but that its finished state was closely reproduced in other manuscripts. Muratova suggests that the fact that the Ashmole Bestiary has many of the same animal miniatures as the Aberdeen, but simply reversed, shows how the mechanical transfer method of pricking allowed the workshop to produce several copies of the same product, but with slight variations in design to make them unique.\textsuperscript{56} It could also simply be a case of the artist accidentally getting the wrong side of the pricking template upwards.

A less exact method for copying was simply to try to reproduce a miniature as closely as possible with a freehand drawing, but this, of course, demanded a practiced and trained eye and would have been done successfully only by a master artist. This method, however, would allow for more flexibility and would account for the instances where paintings are almost exactly alike except in size and small changes in gesture, features, and placement. Xenia Muratova mentions the sketches in the margins of the Aberdeen Bestiary and concludes that they were not done as something to be filled in

\textsuperscript{53}Muratova, "Workshop Methods in English Late Twelfth-Century Illumination and the Production of Luxury Bestiaries," p. 53.
\textsuperscript{54}Muratova, "Workshop Methods in English Late Twelfth-Century Illumination and the Production of Luxury Bestiaries," p. 58.
\textsuperscript{56}Muratova, "Workshop Methods in English Late Twelfth-Century Illumination and the Production of Luxury Bestiaries," p. 58.
with paints, but were made as suggestions to the miniaturist. Indeed, the finished paintings do have differences, although the main composition was followed. Such drawings are found in other twelfth- and thirteenth-century manuscripts, so it is not a technique peculiar to this workshop alone. Since some vellum is, to a degree, translucent, I also wonder if, where pricking is absent and two miniatures are almost exact duplicates, the new piece of vellum was not simply placed on top of the original and the image traced onto it from the one beneath. This would, of course, be difficult if there were text written on the back of the area left blank for a miniature, but the method could have been used in certain instances, especially if the exemplar was only a pen and ink line drawing. A simple outline has more contrast when being viewed through a translucent material and would thus be easier to use for tracing.

Comparing the Miniatures

Because, as mentioned above, the Vatican Bestiary is so different from the other six bestiaries, I will exclude it from this comparison. Also, this discussion must necessarily be somewhat general because of the large amount of material being examined. This is not meant to be a detailed analysis of the six manuscripts being considered, but rather general observations of trends and styles to guide me in deciding in what manner and style I should organize and illustrate my own manuscript.

As stated earlier, the text and miniatures are always linked together, with the miniature preceding the text on that particular subject. This means that the miniatures appear in any position within the text area, and will sometimes occur on the bottom of a recto page with the text beginning at the top of the verso, which seems an awkward separation of image and text. The miniatures are all of widely varying sizes, having

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57 Muratova, "Workshop Methods in English Late Twelfth-Century Illumination and the Production of Luxury Bestiaries," pp. 54–56.
little or no standardization within a manuscript. All have frames, most of which are either rectangular or circular in shape. All six manuscripts have elements that protrude outside of these frames to varying degrees. From these general rules, I will proceed to a more specific comparison.

First, with reference to Figure 8, I will discuss the frames in the Morgan, St. Petersburg, and Alnwick Castle Bestiaries together, since they share so many similarities. The width of the rectangular illustrations in the Morgan and St. Petersburg manuscripts is defined by the ruled double vertical lines that delimit the width of the text. Since there is a double ruling at both left and right, this leaves room for some variation in width, but basically the rectangular miniatures attempt to stay somewhere within the width of the vertical guidelines. As to how far they extend down the page, those before the section on birds are generally about ten to thirteen lines tall, but with several exceptions. In the reptile section, the illustrations can be as short as only four lines. The round miniatures are mostly for birds and vary in diameter. There are two notable exceptions to these two frame shapes. One is the miniature for bees, and the other is for the cinomolgus. The illustration for the bees is a wide rectangle with a dome shape on the top at the left end. This irregular shape appears in all three manuscripts. The cinomolgus is also irregular in shape in all three manuscripts, assuming the shape of a fat, backwards “L.” In the Morgan and St. Petersburg Bestiaries, the shape is divided up into a small rectangle on the left, and a very tall, thinner rectangle on the right, having the irregular shape of a stylized Gothic tree along the top. The frame in the Alnwick manuscript is one continuous outline with all sides being straight. The Assida, or Ostrich\(^58\) is an exception to the rule of miniatures being identical in the Morgan and St. Petersburg Bestiaries, and the difference is in an omission. In the Morgan, the

\(^58\)Kauffmann incorrectly identifies this section in the Morgan Bestiary as “eagles” in Romanesque Manuscripts 1066–1190, p. 126; the text following the image identifies it as the assida, which both Muratova (St. Petersburg Bestiary) and Millar (Alnwick Castle Bestiary) identify as the ostrich.
Figure 8. Irregular Frame Shapes in the Morgan, St. Petersburg, and Alnwick Castle Bestiaries.
frame is the usual rectangle, but with an upright semicircle in it. The St. Petersburg artist simply left out the rectangle and kept the semicircle, which makes the birds appear as under a vaulted sky. The frame is also rectangular in the Alnwick manuscript, but lacks the semicircle. The Alnwick Bestiary has several other irregular frame shapes besides the two already mentioned, and some are shown in Figure 8. The frames in this bestiary differ in another respect from those in all the other manuscripts, including the St. John's and the Bodleian. The majority of the frames are a double line, sometimes filled in with a colored wash, sometimes not. But there is also a significant number of frames which are simply a single line, which makes them, to me, appear much less frame-like and visually less effective in setting the subject off from the text.

The next two bestiaries to be considered are the Ashmole and St. John's College. In these bestiaries, all the circular frames have been enclosed with a slightly larger square frame, so that all the images are bordered by straight-sided, square or rectangular frames, with small elements occasionally protruding outside. A notable exception to this is the dove in the middle of a green cross on f. 44 of the Ashmole Bestiary. The dove, situated about two-thirds of the way down the center of the text area, is in a circle, which is inside a square frame; from the circle radiate the arms of a cross to the width of the text, with the top extending slightly more than half-way up the page, and the bottom extending into the lower margin. The text is written around the arms of the cross, interrupting several lines of text going across the page. Another unusual shape was used as the solution to making room for the end of a single word, and it occurs for the saura miniature in the same manuscript. The accommodation of a word or two is usually accomplished by a simple notch being taken out of one corner of the rectangle, as with the Basilisk and Coot in the Alnwick Castle manuscript (Figure 8). In order to allow for the letters "cendium" above the miniature of the Basilisk at the
left margin, the artist simply made the miniature into a trapezoid with a horizontal base. The trapezoid was only two lines tall under "cendium," but grew to three lines tall by the time it reached the right margin.

These two manuscripts are the first in this discussion to have full-page illustrations. In the Ashmole, there are two pages depicting the lion and its habits, shown in three panels on each of the two pages. The St. John's College Bestiary has only one page with three panels for the lion. This manuscript also has other full-page illustrations, one with four panels showing Creation scenes, one for Adam naming the animals, and a full page at the end of the manuscript for the Firestones. Otherwise, as with the three earlier bestiaries discussed above, there do not seem to be standard sizes for the miniatures. The majority of the miniatures in the Ashmole and St. John's College manuscripts are narrower than the width of the text area, unlike in the first three manuscripts discussed (excluding the section on birds, which were originally in circular frames and were not as wide as the text area in the three earlier manuscripts, either). The miniatures, with a few exceptions, usually are flush with the left text margin, so there is a column of space on the right in which text is written. These columns can be particularly narrow in the Ashmole Bestiary, sometimes with space for only six or seven letters on a line.

The frames in the Ashmole Bestiary are more complicated in their decoration than those in the St. John's College manuscript as well as those in first group of three manuscripts discussed. Whereas the other bestiaries have alternating thin and thick concentric outlines of mostly solid colors for the frames, sometimes with a simple pattern of round dots arranged in groups of three, the Ashmole frames have more complicated small repeated patterns painted in them, such as a wavy line with dots, a zig-zag line with dots, spirals, or cross-hatching. In the St. John's College Bestiary, some of the frames have gold in them, usually those that don't have gold in the
background, but they lack the consistent addition of the small repeated patterns. The exception to this rule are the three full-page illustrations in the beginning of the manuscript and the one at the very end, as well as four or five smaller miniatures in various places throughout the book.

The frames for Bodley 764 are very plain when compared to all of those previously discussed. They consist of a wide colored line, predominantly red, which has an outer and inner outline of black. The inner edge has either only a white line next to the black outline, or is gradually shaded lighter to the white line. The first part of the manuscript, up to the section on birds, but including the eagle and barnacle, has double frames, with the second, inner frame being a different color but also having the same white inner line or graduation to white next to the inner black outline. When, occasionally, these frames are decorated, the pattern is very simple, usually only a repetition of a white curved line with a small dot at the end. Most of the frames are rectangular or square, with the exceptions occurring in the last half of the manuscript. Three miniatures have slight notches cut out of them and one, the hydrus, is L-shaped. The circular frames usually surrounding the birds are gone entirely, unlike in the previous two manuscripts where they had been enclosed in squares.

The main colors used in all six bestiaries are bright red (probably vermilion), blue, green, a reddish-brown, white, and black. Other colors, such as grey or a darker brown, are obviously mixtures of two or more of the main colors. There is occasional use of other colors, such as yellow or a different red, but these other colors don't appear until the manuscripts dated after the beginning of the thirteenth century. This means that the animals are often not portrayed in a realistic color, such as the blue bear in the Morgan Bestiary or the green elephant in Bodley 764. The Morgan and St. Petersburg Bestiaries have the most unnaturally-colored animals because they are earlier and have more limited color palettes. Bodley 764 tends to use more plausible colors,
showing the lion as tawny (although it is also shown as red), the antelope and pard as reddish-brown, the beaver as almost black, for example.

The initial letters at the beginning of each section are treated variously. The earlier Morgan and St. Petersburg manuscripts have red initials decorated with blue or blue initials decorated with red. The decoration is a simple line drawing of a scalloped leaf motif, usually within the counter of the letter, but sometimes extending into larger flourishes in the margins. The initial letters of the Ashmole Bestiary, with the exception of two letters in the Creation section and the “L” at the beginning of the lion’s text, are treated in much the same manner. The initial letters in the St. John’s College manuscript, however, are all gold and enclosed within straight-sided shapes, usually a square or rectangle. These shapes are painted with various colors and embellished with simple white line decorations. The Alnwick Castle Bestiary has colored initials decorated with fine line flourishes of delicate loops and curlicues, both within the counters of the letters as well as in the margins.

Although each manuscript is painted in a very different manner, there are certain elements that definitely show the progression from late Romanesque to the early Gothic style. Lehmann-Haupt describes miniatures of this period as being “... arranged in decorative patterns of composition, faces drawn in simple lines, garments stylized.” That the miniatures are composed in decorative patterns, I think holds true for all six manuscripts. But not all the figures are treated in the same manner. Four of them seem to be very similar in style, having the faces defined by simple lines, namely the Morgan, the St. Petersburg, the Alnwick Castle, and the Bodley 764 Bestiaries. In these manuscripts, a few lines define well proportioned faces and bodies. The animals are also fairly well drawn, although the figures and animals in the St. Petersburg manuscript are often not quite as well drawn as those in its close relation, the Morgan.

And in the Alnwick Castle Bestiary, many of the animals do not seem to be of the same quality as the human figures. Bodley 764 shows the most refinement of this style. Everything is still outlined in black, but there are also many extremely fine detail lines. The faces show individual characteristics, such as different noses, hair, and eyebrows, and the fur and hair on animals is depicted in great detail. In spite of the evidence that the Gothic style had already appeared in England with the Ashmole and St. John’s manuscripts, the preference for using fine lines persisted into the Gothic period in England. As Saunders has observed:

But as England had had a more developed linear style in illumination during the Romanesque period than had any of the other European nations, so it is only natural that there should be a more pronounced linear quality about some of the best work in England, even in the thirteenth century, than there was in any French illumination of the same period.60

The St. John’s College and Ashmole miniatures are done in quite a different style. Figures and animals are still outlined in black, but details are not shown predominantly with smaller black lines, as in the four manuscripts mentioned above, but with more shading in various colors and white highlights. The figures in both manuscripts are elongated and body parts are not proportional in size. The faces in these two manuscripts are defined with very few lines and more by shading, rather than mostly by lines, as in the other bestiaries. There are also more landscape elements, such as stylized trees and bushes, and more patterns, usually in white, on frames and in backgrounds. To my eye, the figures and drapery are much more stylized and less natural looking than in the other four bestiaries.

There are, then, only a few characteristics that apply to all the bestiary miniatures discussed. They were done in a variety of styles, sizes and shapes. They were placed anywhere on a page, following only the rule that the miniature directly

precedes the text or is placed to one side of the beginning of the chapter. And the figures in certain illustrations are so similar that they obviously have either a shared source or the later ones were copied from an earlier manuscript. Since the miniatures varied so greatly in placement, size and shape within a single manuscript, careful coordination of text and miniatures would have been necessary. These manuscripts show the great variety possible within what might be considered a fairly rigid format.
CHAPTER III

PRODUCTION METHODS

General Production Methods

My sources for the practical experience necessary to construct my version of a thirteenth-century English Bestiary are many. I was an exhibiting fine artist for about ten years before I became interested in the book arts and began delving into their many facets somewhat at random. My first encounter with medieval calligraphy was sometime in the early 1980's at an International Congress on Medieval Studies at Western Michigan University. This was the first time Mark Van Stone gave a hands-on workshop on scribal techniques, which included some calligraphy as well as preparation of the quill. Through other workshops and my own research, I picked up other skills during the next few years. My most recent experience was a two-week medieval bookmaking workshop given in July of 1995 by Jim Croft and conservator Jack Thompson in Santa, Idaho. I have also gleaned much valuable knowledge and many informative contacts through the Internet. I must say, though, that my previous experience did not totally prepare me for the differences between working on paper and working on vellum.

General Trends in Manuscript Construction

The period of the last half of the twelfth century and the first half of the thirteenth was a time of great transition in book production and techniques. The popularity of manuscripts, especially illuminated ones, had increased and secular production houses were created to meet the demand. Although there are a number of
manuscripts with original bindings from the twelfth century, there are virtually none still in existence from the first half of the thirteenth. Late thirteenth-century and fourteenth-century bindings show the results of the changes, but not how the manuscripts appeared during the transition period. For example, spine tabs were used less frequently until they finally disappeared altogether, and the number of sewing stations gradually increased. The use of flat split leather bands at sewing stations gave way to rolled thongs and eventually to fiber cords. Books were more often covered with leather rather than left with bare boards or put in chemises, and the leather was eventually decorated with blind stamping. One element that took longer to change on English bindings was the fastening. English bindings were kept closed with a single strap that wrapped around to the back, where it fastened. The use of a single strap persisted into the fourteenth century, long after other countries were using multiple fastenings. Outside of this aspect, a manuscript bound in England during the transition period at the beginning of the thirteenth century would have used a mixture of old and new techniques. But exactly when, how and in what order these changes took place is unknown. This is the time period encompassed by my own Bestiary.

The quality of work was judged very differently in medieval times than it would be today. Our modern standards require a state of precision and perfection that was not used for medieval manuscripts. Today, books and calligraphy done by hand must line up exactly, be trimmed straight, and have the same consistency as results from machine production, ironically. To modern eyes, a medieval manuscript appears somewhat sloppy and unfinished. The leather turn-ins on the insides of the boards usually were not trimmed straight, as they would be today. The calligraphy was often not as perfect as is strived for in modern times, and there are passages blatantly crossed out and corrected; sometimes an extra line or two occurs at the bottom of a page, or a scribe

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61From a personal interview with Christopher Clarkson on August 17, 1995.
greatly condenses his letters to fit a passage into a particular space. The channels carved in the boards for the bands are often quite crudely done, and the brass metalwork on the covers often looks more spontaneous than precise. Blind stamped patterns on bindings often do not have the same highly developed sense of design that we take for granted in our time. This doesn’t mean the workmanship was poor; it just means it should not be judged by the same standards and expectations we use today.

Secular Workshops or Monastic Scriptoria

One of the most puzzling aspects of medieval Bestiary production is determining where the manuscripts were produced and for what audience they were intended. The Aberdeen and Ashmole Bestiaries are dated to around the beginning of the thirteenth century. They are so similar that it is assumed they were produced at the same place. The Aberdeen Bestiary even has many prick marks on its miniatures, showing that they were copied into other manuscripts. Xenia Muratova maintains that these manuscripts were simply two of many produced at a secular workshop, which means they were probably meant for wealthy lay patrons. However, the Sotheby’s catalog containing the description of the Alnwick Castle Bestiary (now in another unknown private collection), claims that most Bestiaries survived in monasteries. This could indicate that monasteries had originally produced them.

From my experience, monasteries, up to and including this time, did not usually use lavishly illuminated manuscripts except for texts associated with the liturgy. Such manuscripts were used during services, often open to view, and so would have been decorated to go with the other elaborate furnishings. The exceptions, of course, were

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62I am using the term “band” to describe a strip of leather used as a sewing support. Both Pollard and Clarkson use this term, but Pollard also uses “thong” and Clarkson also uses “slip”; for clarity, I am confining myself to “band.”
Cistercian churches, where elaborate decoration was discouraged. And yet, the earliest existing bestiary in which there are painted miniatures with gold backgrounds, is the Morgan Bestiary from around 1185, which was the gift of a canon to an Augustinian Priory. This is not a manuscript that would be used during services, and yet it is fairly richly decorated by the standards of the time with many colored miniatures with gold backgrounds. Perhaps it was their value as teaching tools that gave bestiaries a status elevated enough to warrant the expense and time put into them. As Willene B. Clark states, “they appealed especially to preachers and teachers who mined the riches of their animal lore for colorful didactic images.” Beryl Rowland discusses the use of numerous illustrations as an aid to memory and supports the theory of the bestiary being used as a means of teaching Christian doctrine.

Ranked with the Psalter and the Apocalypse as one of the leading picture books in twelfth- and thirteenth-century England, it may be seen as an attempt to instruct the laity in the Christian life by impressing relevant images on the memory.

That the Morgan Bestiary was given to a monastery of the Augustinian order could be important, because the Augustinians were dedicated to preaching and to the education of the common people. At the very least, bestiaries were likely used as a resource for teaching lay brothers, who were particularly numerous in Augustinian and Cistercian houses in the late twelfth and early thirteenth centuries.

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66Clark, Willene B., pp. 22-23.
Vellum

The difference between making leather and making vellum or parchment is how the animal skin is processed. Making leather is a chemical process, whereas parchment is produced through a physical change brought about simply by drying the wet skin while under tension. Leather is tanned or tawed to preserve it, sometimes even leaving the hair on. Other than the chemicals used to remove the hair, making parchment does not use chemicals to change the physical properties of the skin. The physical scraping removes certain layers, and the stretching while drying modifies the fiber structure into a layered configuration. If parchment becomes wet again while not under tension, it buckles and curls and becomes stiff.

It is not within the scope of this paper to participate in the debate over the difference, if any, between parchment and vellum. At the present time, many people seem to use the terms interchangeably. Even in the trade, there is disagreement, “parchment” being used for a lower grade product made from sheepskin splits, and “vellum” for the better grades of skins. It seems to get even more confusing because users (calligraphers and binders) tend to use “parchment” as a generic term for all skins prepared for writing, and reserve “vellum” for the particular sort made from calf skins. Since I did actually use calf skins, I will use the term vellum most of the time to refer to the material I worked with.

A parchment maker was called a “percamenarius” in medieval times. The earliest documentary evidence of such a profession in Oxford is on an early thirteenth-century land charter signed by, among others, two parchment-makers named Reginald

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67 Reed, R., Ancient Skins, Parchments, and Leathers, Seminar Press, London, 1972, p. 120. This is an excellent book with many more details than I can cover in the scope of this paper.
and Roger. The process for turning an animal skin into something to write on is quite long and, in the first stages, rather malodorous (and that’s being kind). It takes quite a bit of skill and practice to know when to do certain operations and how to scrape. In July of 1995, I did participate in the production of one skin, scraping the hair off after the skin had been soaked in lime for over a week, and doing scraping at later stages. But this was not something I had the time, desire, or place in my small urban house to master, especially for this project. So I will describe the process and the special adjustments made by my vellum maker, Mr. Rick Cavasin of Kanata, Ontario.

I was particular about what animal would be used. Sheep is notorious for being greasy, which can interfere with inks and paints adhering well to the parchment, especially over time. Kid skins are rather small and would give me a fair amount of waste per skin. Goat and kid skins also tend to be a little more greasy than calf. My folios were going to be relatively large, and in order to maximize usable skin area, and also because it is known for being a very good writing surface, I chose calf as the animal for my vellum. Mr. Cavasin found that at certain stages he had to modify slightly his treatment of the calf skins from his usual practice for some other skins. The process I will be describing is what he did for my calf skins. The durations given below are not exact because the hides were processed in batches, and the times varied slightly from one to the next. The time spans given, then, should be taken as average for that stage.

Mr. Cavasin obtained some of the skins in a salted state from a hide broker; most likely they had been piled together for a time with salt, since most of the moisture had been removed. These skins needed to be washed and soaked a bit, and then were

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69These details are taken from electronic correspondence with Rick Cavasin on January 3, 1996 and were also corrected by him later that same month.
given a preliminary fleshing to remove any large bits of fat, membrane and other undesirable materials. He obtained other skins directly from an abattoir, in a frozen state. These skins needed only to be thawed and then fleshed.

The skins were next put in a brine bath to help extract residual blood from the hides. This bath was changed several times, and, after a day or so, he switched to plain water baths. After about three days of this soaking and washing routine, the skins were put into a bath of old lime, used previously for the second liming of another batch of skins. The lime is calcium hydroxide and helps to clean the skin, remove oils, and loosen the hair. The skins were stirred at least twice a day and, about every day or so, lifted out and hung on a horizontal bar over the bath to drain. It took about a week or so of liming for the hair to be loosened enough.

The next steps were unhairing, scudding, and fleshing. For the unhairing, the skin was placed over the curved side of a large half-round piece of wood and the hair scraped off with a blunt, two-handled knife. After the hair was removed, this same side, the grain side, was further scraped in a process called scudding, which removes pigment granules, glands, oil, and digested epidermis. When the hair side had been fully scraped, the skin was turned over to the flesh side, which was scraped with a sharp, two-handled knife with a curved blade. This step removed any remaining flesh and connective tissue and had to be done very carefully to avoid making holes in the skin.

Now the skins were ready for a fresh lime bath lasting seven to ten days, during which they were, as before, stirred several times a day and occasionally drained. This was followed by a second round of scudding and fleshing to remove anything undesirable missed the first time. When this was completed, the skins were then placed in frequently changed baths of plain water to remove the lime. The final bath contained some vinegar to neutralize fully the lime and reduce pelt swelling back to its normal
state. After this final bath, the skins were either put on a frame or bagged and frozen for storage until a frame was free.

The hides were tied on stretching frames called herses. This was done by placing a smooth, round object (pippin), such as a stone, at the edge of the skin and pulling the skin down and over it. One end of a rope was then tied around the skin with the pippin in it, and the other end tied to a peg on the frame; pippins were placed in this manner evenly around the edge of the skin. The pegs could be turned during the drying process to adjust the tension on the skin. The flesh sides were punched (scrapped) with a burred semilunar knife and then with a sharp semilunar knife, after which they were allowed to dry a day or two.

Mr. Cavasin then shaved the grain away from the hair side with a sharp semilunar knife, and sanded both the hair and flesh sides with a palm sander using 220 grit paper. He next went over both sides again, this time with a pumice block, to smooth them further. He then rewet the skins and punched the hair side with a sharp semilunar blade. The ropes were readjusted for correct tension as necessary. When the skins were dry, the hair side was again briefly sanded with the palm sander and gone over with the pumice block. To finish the flesh side, he usually only needed to go over it by hand with 600 grit paper. The hides were then left to season on the frames for a few days before being cut down. The main variation in his procedure was in the sequence of shaving, sanding, and pumicing. Each skin took a total of about ten hours to process, although several skins were processed together in the soaking and liming stages, which saved some time.

I did have one calf skin that I had bought a few years ago from another source, but it had not been finished as well as Mr. Cavasin’s skins. Because it was in such an inferior condition, I decided to spare myself the extra work of sanding and pumicing the skin and used it instead for the endleaves of my book. The difference between the
inferior skin and Mr. Cavisin's skins can be seen and felt most easily on the outer side of the endleaves. This side feels slightly waxy and rough when compared to Mr. Cavisin's skins, which have a smooth velvety feel on both sides of each bifolium.

I had several things to consider when choosing my skins. The one consistent slight irregularity that Mr. Cavasin encountered in the skins, and which I also saw from other makers, was having translucent spots appear where the shoulder and pelvic bones had been. Sometimes areas on the skins were mottled or discolored for various reasons. Medieval parchment-makers also would have had many tiny holes to contend with where animals had hurt themselves or been bitten by insects or other animals, but the skins Mr. Cavasin worked with had few defects of this nature. The other variable was the thickness of the skins. It is extremely difficult to judge the thickness while the skin is being processed, so Mr. Cavasin had to guess at how much to shave each time. As a result, a few skins did turn out too thick for use in a manuscript. Color was not much of a factor since most of the skins were quite light in color and within an acceptable range. I avoided as much as possible choosing skins with small holes, discolored areas, and particularly translucent spots that would occur in the text area. Medieval scribes would not necessarily have had this luxury or even cared about these things. There are many examples of manuscripts where holes in the parchment have simply been written around; flaws were part of the material and were simply coped with as best as possible. I, however, had the luxury of being able to be a little more discriminating and chose vellum with as few flaws as possible.

When cutting the bifolia out of the vellum, I ended up having the grain of the vellum run across the folios, rather than the more desirable direction of up and down. The grain on vellum follows the direction of the animal's spine, and the vellum in the

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70This is a different sort of grain from the hide grain that was mentioned earlier in this section. This grain refers to the direction of the internal fibers, whereas the hide grain that was scraped off refers to the layer with the hair follicles in it.
spine area can also be thicker and somewhat stiffer, depending on how careful the
parchment-maker was. The grain is less pronounced the farther you get from the spine
and curls around a bit, unlike modern machine-made papers, where the grain direction
is very strong over the entire sheet and definitely in one direction. Manuscripts and
books fit together best if the grain direction of all elements is the same, that is, the grain
of the boards and all paper or parchment used. Folding the bifolia in half is much easier
and the crease is smoother going with the grain, especially with paper. But medieval
scribes did not or could not always pay attention to this, and quite frequently in
manuscripts, the grain runs in different directions on different leaves. This was
probably because out of each skin, sheets would have been cut so as to make the best
use possible of the material with little wasted. Vellum was precious even back then,
especially since it meant the loss of an animal to produce the skin. Since my folios were
fairly large, the best way to make use of the skins was to have the length of the bifolia
run parallel with the spines of the skins, allowing me to get as many as four bifolia out
of a skin from which I would otherwise have gotten only two, with a lot of waste
(Figure 9). For best results, I did not mix the grain direction of my folios.

Another important detail when folding was to make sure hair sides and flesh
sides followed a certain pattern. Hair sides and flesh sides each have a slightly different
appearance as far as texture and color are concerned. They were usually kept together
so that when a book was open, both pages looked the same, that is, both were hair or
both were flesh sides. If the size of the pages was small enough, a large piece of vellum
could be cut and simply folded in half three times; when the folds on the edges were cut
open, there were four bifolia, magically with matching sides together. I had to be more
careful since my larger bifolia were cut singly. This meant I had to fold hair sides and
flesh sides together alternately. In medieval times the usual custom was for the hair side
to be the first and last page of a gathering. It was just the opposite for Greek Orthodox
manuscripts, those from the late Roman Empire, and later manuscripts from the fifteenth-century Italian Humanists.\textsuperscript{71}

Figure 9. How the Vellum Was Cut for the Rups Bestiary.

Page Proportions

One aspect of manuscript production that was difficult for me to research was the proportions of the page layout, that is, the dimensions of the text and miniature area and the size of the page margins. Of the six manuscripts under consideration, I can only say with some certainty that one of them has probably not been trimmed since it was originally produced, namely the Aberdeen Bestiary. The others have embellished initial capitals or marginal notes that have been partially trimmed away, indicating that the manuscripts do not have their original proportions. This is not surprising since it was acceptable practice in the eighteenth century for large numbers of medieval volumes to be rebound in what were considered more tasteful bindings. Trimming was part of the

\textsuperscript{71}De Hamel, \textit{Scribes and Illuminators}, p. 19.
process for various reasons, such as removing water stains, worm damage or edges stained from many thumbings, to even up the pages after resewing, or even simply to give the book what were considered at the time to be better proportions.

Jan Tschichold has made a study of manuscripts to determine if, in books where obvious thought was given to the appearance of the page, there were certain proportions that were commonly used. He determined that, ideally, text area is the proportion of the Golden Section or Golden Rule, that is $1:1.618$. The page proportion for many late medieval manuscripts was $2:3$, with the page width being the measurement for the height of the text area. The margins of a left-hand page would then be in the ratio $2:3:4:6$, with two being the inner margin, three being the top margin, four the outer margin and six the bottom one. But these late medieval books were usually written with two columns per page, and the bestiaries are earlier and have only one column per page. For such earlier manuscripts Mr. Tschichold has determined that the page proportions were still $2:3$, but that the margin proportions (for a left-hand page in the same order as above) were $1:1:2:3$. The lower left corner of the rectangular text area is found by drawing a diagonal line from the upper right corner of the page to the lower left as well as marking off on the same left page the section of a circle whose radius is the length of the diagonal and whose center is the lower right corner of the right-hand page. The point of intersection of the left-hand page diagonal and the circle section is the lower left corner of the rectangular text area. Since the height of the text area is the same as the width of the page, you already have one measurement. Although it is difficult to figure mathematically, it is not difficult to do geometrically (Figure 10).

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Half of “a” gives “b”, and $a + b = c$ 

center point for arc

Figure 10. Method for Finding Medieval Single-Column Text Area 
According to Jan Tschichold.

I have used this geometrical method to draw the projected margins and text area proportions of the manuscripts under consideration given their present page sizes, and found that only one conformed to the ideal proportions as presented by Mr. Tschichold. This was the Aberdeen Bestiary, the manuscript I had noted did not seem to have any trimmed images. It seems like too much of a coincidence to me for this to be other than a planned occurrence and I would suggest that in many cases a geometrical drawing using the present folio size could be done to determine if the manuscript in question has been trimmed and what the likely original page size would have been. I am using this method to determine the page proportions in my own bestiary.
There is a ninth-century set of instructions for laying out a page mathematically. According to Dr. De Hamel, it directs that “... the inner and lower margins should be three times as wide as the outer margin and as the gutter between the columns (if it is a two column book) and a third wider than the width of the upper margin.”75 If I understand this correctly, that means that a book with an outer margin of one inch would have inner and lower margins of three inches and an upper margin of two and one quarter inches, or close to that. This makes little sense to me because it computes the inner margin of the page to be larger than the outer margin, which gives the visual impression that the text is trying to move off the page. The only way this would make sense would be if the measurement for the inner margin ignored the fold and went from the edge of the text on one page across to that of the other page. At the least, the ninth-century instructions and most other designers from that period onwards were in general agreement that the width of the page should be the height of the text area.

But when three or four bifolia are placed inside of one another to form a gathering, the fore-edge becomes ragged because each inner folio’s fore-edge will stick out progressively more. The books of the time period I am dealing with did not have squares, that is, the textblock had the same dimensions as the boards before they were covered with leather.76 This meant that, after the gatherings were sewn together and the bands laced into the boards, the fore-edge of the text block had to be trimmed so that it was flush with the boards. Graham Pollard found marks on the edges of some boards, and came to the conclusion that the books, boards and all, were put in a vise and a plane was used to trim the vellum pages even with the edges of the boards.77 Personally, I did not find that the top and bottom edges of my manuscript necessarily

75De Hamel, Scribes and Illuminators, p. 21.
76When the textblock is slightly smaller than the boards, as in modern books, the space between the edges of the textblock and the edges of the boards is called a square.
needed to be trimmed, since there was only a slight bit of unevenness, but nothing that much out of line. The fore-edge, however, was uneven. I used a knife to trim the worst off before I used a plane to do the final evening-up.

Calligraphy

Letter Forms

Technology changed many aspects of writing by hand. With the advent of the metal nib, letters could be more uniform. Quills were cut by hand, which meant they lacked uniformity of width, however minutely at times. Also, quills absorb moisture, and the longer they have wet ink on them, the softer they get. This means that the split nib splays out farther and more easily, making the letters slightly thicker. In addition, the broad writing tip was subject to wear and needed to be recut periodically. Such things do not happen to metal nibs. Although they can gradually become softer with use, it would not happen as quickly as to a natural quill pen. With the advent of printing, letters were viewed differently. Printed letters were consistent, and this expectation of consistency became a part of judging hand-drawn letters, too. Instead of writing being simply a means to preserve a written record, the printing press brought more exacting standards to hand-written letters. It became a great achievement to be able to write things so perfectly by hand that they looked as if they could have been printed. This is ironic when one considers that the first typefaces were designed to imitate hand-written letters. A desire for uniformity is still the case today, where even a neat hand is judged by how consistently the letters are drawn. It seems strange to me, for if something can be done so perfectly by hand that it looks like it could have been typeset and printed, then why not do it that way? The imperfections of hand-drawn letters are what gives them their energy and character. Our machine-produced goods
have made consistency a virtue and a goal. I am not saying that I do not appreciate well
made letters, just that I think that a certain expectation of perfection and consistency can
dry the life out of some modern calligraphy.

The main source from which I copied my text was the St. John's Bestiary. There were several reasons for this choice, one of the main ones being legibility. Also
important was the fact that the letters were larger than in the other bestiaries. It is easier
to write larger letters than smaller ones, and the letters in the St. John's Bestiary were
close to the size I wished to do and felt comfortable to write. Unlike a medieval scribe,
I did not need to write small to fit as much as possible on a page. On the contrary, I
needed to fill a minimum number of pages or there would be problems with the
binding. I also had a limited amount of time, and writing small would mean more space
left to fill to meet my minimum page requirements. Another advantage came when I
made my mock-up to work out spacing. Since the letters in the St. John's Bestiary
were close in size to my own, I could just photocopy my prints from the microfilm and
cut and paste the bestiary's text to estimate space requirements.

Although I used the St. John's Bestiary text as my main source, I also worked
with the Ashmole text beside it for comparison. This way I could check illegible words,
misspellings, missing passages, and other differences. If something still was not clear,
I would check for the same text in one of the other bestiaries. The text for the centaur,
however, did not appear in the St. John's Bestiary, so I used the text from the Morgan
Bestiary.

Deciding how to form the letters and use abbreviations took a bit of time to
work through. I tried to make my letter forms and text look typical for that time and
also to incorporate interesting differences I found in the various bestiaries. For
example, I deliberately left out a couple of lines so that I could show the method the
scribe in the Aberdeen Bestiary used to correct such a mistake. The method was simply
to insert a symbol in the text as we would an asterisk, draw the same symbol at the bottom of the page, and write in the missing text. Something else interesting was the way the scribe in the St. John’s bestiary had of writing the “;” abbreviation for “us.” He connected the two strokes into a symbol resembling a number three (3), and I used this extensively, although I did alternate it occasionally with the “;” abbreviation. I have written about these and other aspects of writing the text and painting the miniatures in an artist’s diary that I kept while working on my bestiary.

Marking Guidelines

One of the differences between modern and medieval calligraphy techniques is how the page is marked up for writing. These changes have come about through developments in technology and as writing masters came to the fore in the seventeenth century.

The first thing a medieval scribe would do would be prick the vellum as a preliminary to ruling guidelines for the text. Bifolia would be pricked on the outside edges as guides for drawing these lines with a lead point or light ink, or for scoring. These prickings are frequently no longer to be seen because often they were far enough to the edge of the bifolium that they were cut off when the text block was trimmed along the edges of the boards. Modern calligraphers also set up guidelines, but usually with light pencil lines, which are later erased, or on a separate sheet of thin paper which is placed beneath the writing page on a light table, so that the guide lines show through to the original.

The medieval scribe simply gave himself an upper and a lower line between which he did his writing. Modern calligraphers set things up much more exactly, in keeping with their attempt at uniformity. A baseline is drawn upon which all the letters rest; then a line is drawn above that one to indicate the height of the lower case or
minuscule letters. A third line is then drawn above this one to indicate the height of the majuscule or capital letters. Lines are then drawn to indicate the length of the descenders and also possibly the ascenders, where they are taller than the capital letters in a particular style of writing. This system of three to five lines is then repeated at regular intervals down a page to accommodate the text being written.

Medieval scribes tended to set the base of their letters very close to the line, but usually not quite touching it, as a modern scribe would. In the later formal gothic writing, the object seems to be to place the letters equally between two guidelines. But the medieval scribe had no lines to mark off the height of his letters, so his writing was, of course, often less exact than that of a contemporary scribe. In medieval times, a scribe’s writing was judged by its legibility and accuracy as well as by how the page as a whole looked, whereas today, there is added to this an emphasis on exact consistency in letter forms.

Those who copied and decorated manuscripts were not necessarily members of a religious order. Whereas, for a few hundred years, monasteries had been almost the sole keepers and copiers of manuscripts, the twelfth century saw an increased demand for texts, not only within the Church but also by the lay community. To meet the demand, secular businesses were set up to produce manuscripts and lay persons hired themselves out to monasteries. Members of the monastic communities of both Christ Church and St. Augustine’s in Canterbury could write and paint very well; whereas a chronicler named Simon writes that Abbot Faricius (1100–17) at Abingdon had in his employ six “scriptores” (i.e. professional scribes) for copying patristic manuscripts so that the “claustrales” (i.e. monastic scribes) could copy service-books.78

Before the twelfth century, production of manuscripts was for the most part

probably unhurried and in the hands of only a few people, usually within the confines of a monastery. Thereafter, book production increased and more persons were involved in the work. Whereas earlier, the same scribe who had written the text might also sew the gatherings together, in later times this task would probably have been passed on to another worker. Keeping the gatherings of bifolia in the correct order was, therefore, quite important. In earlier times, scribes usually simply assigned letters or numbers in sequence to the gatherings, writing them on the first or last page. The gatherings would then be carefully bound in the order A, B, C and so forth; sometimes the letter “Q” for “quaternio” (quire) would be written before them. But as book production increased in the twelfth century, it became possible for gatherings to get mixed up with one another when more than one book was in production or even several copies of the same one. To remedy this, scribes would write the first word of the next gathering on the lower inner part of the last page of the preceding gathering.79 Since letters for marking quires and catchwords would be appropriate for a manuscript made at the time of my Bestiary, I have used them. I am also using a series of small simple symbols on the recto side of the first four folios in every gathering so as not to mix up the order of the leaves within the gatherings. This method was used in the Aberdeen Bestiary.80

Inks

Two kinds of ink were used from classical times onward, namely carbon ink and gall ink. The recipe for carbon inks is found in manuscripts until the twelfth

79De Hamel, Scribes and Illuminators, p. 41.
80I found the Aberdeen Bestiary on the World Wide Web as a collaborative project of Aberdeen University Library, the Department of the History of Art, and the Centre for Computer Based Learning in Land Use and Environmental Sciences. The site includes color images of all the miniatures, transcriptions of the text, and art history commentary among other things. The quire symbols are mentioned in the section on codicological information. The historical consultant for the commentary was Jane Geddes and the textual consultant for transcription and translation was Colin McLaren (URL http://www.clues.abdn.ac.uk:8080/besttest/firstpag.html).
century, after which recipes for gall ink occur. This does not mean that iron gall ink did not exist before the twelfth century, only that it does not appear in written accounts before that date. It is not clear from Dr. De Hamel’s account whether the gall recipes occur to the exclusion of carbon ink recipes, but the impression is that by around the twelfth century, gall ink was generally the predominant ink used for writing in manuscripts.  

The principal ingredient in gall ink is mature oak galls, which contain gallic and tannic acids. Oak galls are the result of the tree having a wasp larva laid upon it. The gall grows up around the larva until the larva becomes an insect and bores its way out. This is the point at which the galls are picked for use in ink. The galls are crushed into coarse pieces and soaked in rainwater for several days in the sun or near a fire. Just to give a sense of how “precise” these recipes are, Pietro Maria Canepario wrote in 1619 that a faster method than soaking the galls was to boil them for as long as it took to say the “Pater Noster” three times. Alternative recipes use wine or vinegar in place of rainwater.

The second ingredient was ferrous sulfate, also known as copperas or green vitriol. This chemical could be made, but it also occurred naturally in Spain, where water evaporated from ferrous earths. Later medieval inks are very acidic, and it could be because the ferrous sulfate was then made by pouring sulfuric acid over nails, filtering the liquid, and then mixing it with alcohol.

The oak gall liquid and the copperas were then combined and some ground gum arabic added for thickener. The ink starts out a pale brown, but a chemical reaction takes place, making the ink eventually become black. This color becomes even darker.

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81De Hamel, Scribes and Illuminators, p. 32.  
82De Hamel, Scribes and Illuminators, p. 32.  
83De Hamel, Scribes and Illuminators, p. 32.  
84De Hamel, Scribes and Illuminators, p. 33.
when the ink is exposed to the air, such as on the pages of a manuscript; it is also shiny in appearance and tends to soak into vellum.\(^{85}\)

Before this, and probably for some time after iron gall ink began to be used, there was carbon ink. This ink is blacker than iron gall ink and more opaque. It does not result from a chemical reaction, as does the iron gall ink, but gets its color from the black carbon particles of soot. These were collected and gum arabic was added as a binder. Iron gall ink sank into the vellum and stained it, making it difficult to scrape off mistakes. Carbon ink, however, got its color from the soot particles, which stayed on the surface of the vellum and were easier to scrape off.

Recipes for gall ink vary greatly. Theophilus recommended in his twelfth-century treatise *De Diuersis Artibus* that hawthorn bark be used as the source of tannin.\(^{86}\) Most other recipes I have seen call for oak galls.\(^{87}\) My concerns with making the ink centered around how to know if the gall infusion was strong enough and how to tell if the ink was too acidic and would eat through the vellum after some time, as happened in a number of post-medieval books. I was given some oak galls from Oregon to experiment with, and corresponded with a man who had used galls both from Oregon and from Minnesota burr oaks.\(^{88}\) The galls from Oregon were larger and hollow and the Minnesota galls were much smaller and solid; the galls from Oregon produced a much darker ink, presumably because they contained more tannin. Because of this man’s experience, I was reluctant to depend on Michigan galls for my tannin. I ordered the galls and copperas (ferrous sulfate) from Kremer Pigments in New York City, a supplier of pigments, binders, and other ingredients for historic as well as

\(^{85}\)De Hamel, *Scribes and Illuminators*, p. 33.


\(^{88}\)From electronic correspondence with George Yanagita on January 10, 1996.
modern uses. The galls come from one of the warm climate areas of the Middle East, Smyrna in Turkey, and have a high tannin content.

I also received information from Kristoffer Lindblad in Sweden, a professional calligrapher who has ten years of experience making iron gall ink and researching sources. This is the recipe he recommended that I use. The ingredients are the same that I have found in medieval recipes, but this one has the added bonus of providing measurable quantities, something the early recipes don’t. I measured by weight, using a small balance scale and metal washers as my unit of measure. For this first batch, I used natural dry ferrous sulfate crushed to a fine powder instead of the manufactured crystal form. The galls had been crushed to about the size of small black peppercorns but not crushed so small as coarse powder. Since the galls soak several days in the water, I’m not sure that it makes much difference exactly how finely they are crushed.

1 part gum arabic
2 parts copperas
3 parts galls
30 parts water, distilled (at least purified)

All parts are measured by weight.

1. Crush the galls coarsely to finely.
2. Pour the crushed galls into a glass jar.
3. Add all of the water. Stir with a fig stick.
4. Cover the jar against dust, but not air tight, since the mixture must oxidize. Let this stand in the sun for two days, stirring twice each day.
5. Add the finely-crushed copperas slowly, while stirring.
6. Let it sit in the sun for two more days, stirring twice each day.
7. Add finely crushed gum arabic slowly, while stirring.
8. Let the mixture rest in the sun for another day.
9. Carefully strain the ink into a clean bottle.

There is no way to tell if the gall infusion has enough tannin or if the final ink is too acidic until the ink is finally made. Since it was the middle of winter when I was

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89 From electronic correspondence with calligrapher Kristoffer Lindblad in Sweden, January 8–13, 1996.
90 According to Mr. Lindblad, this recipe is from Dr. Cannearius of Venice, A.D. 1660, and is identical to Palatino’s from A.D. 1540. Christopher De Hamel also describes the making of gall ink in Scribes and Illuminators, pp. 32–33.
making the ink, I was not able to put the crushed galls and water in the sun for a few
days, as the recipe directed. Instead, I decided to simulate the sun, using a slow cooker
or Crock Pot™ (Figure 11). To do this, I put the measured amount of water into a

![Diagram of ink making process]

Lids cocked to let in air for better oxidation.

Small blocks of wood

Figure 11. Cooking Iron Gall Ink in a Slow Cooker

small glass jar and added the crushed galls. I put two small pieces of wood in the
bottom of the slow cooker and placed the jar with the galls and water on top of them;
this was so the jar would not rest directly on the bottom of the slow cooker. I then
poured water into the cooker until it came about halfway up the sides of the small jar. I
set the jar lid on top of the jar, but slightly cocked so that air could enter for oxidation; I
also cocked the lid of the slow cooker so that heat would be kept in but air could also
get in.
Then, over the course of the next five days, I used the "low" heat setting on the cooker. I turned the heat on in the morning (just like the sun comes up), but turned it off for short periods during the day so the mixture in the jar would not become overheated (or like clouds in the sky hiding the sun). At night I would also turn the cooker off, simulating the sun going down. When I added the crushed gum arabic, I used only half the amount, since this would allow me better to adjust the flow of the ink at the time of writing by adding more then, if necessary. After cooking for five days with my artificial sun, I strained the black mixture through a double thickness of cotton cloth and put it in a sealed jar.

My first trials with this ink were a new writing experience for me. The liquid in the jar appeared quite black, but it was only a watery grey when I went to write with it. However, much to my surprise and delight, the letters became a rich black color when dry. The inks I am accustomed to using are dark to begin with, and if they are not, then the finished letters are also not very black.

I have a booklet that is a reprint of a 1596 publication with some notes and explanations included.91 In it there are many recipes that use the same ingredients as in the above recipe, but add to it wine and/or vinegar. Another recipe simply keeps the gall infusion separate from the dissolved iron sulfate until the very last minute, when they are poured together for "instant ink." The publication even includes directions for an invisible ink which depends on the chemical reaction of iron gall ink. The "pouder of victriall" is dissolved in water and used to do the writing, which would be invisible when dry; to reveal the writing, the paper or vellum is put into a dish containing an iron gall infusion.92

My concerns about the acidity of the ink and the possibility of it damaging my

92Thompson, Jack, p. 3.
vellum are addressed by an article in The American Archivist. The examples studied were on paper rather than on parchment, but the results indicated that what happened to the ink was the result of its composition. On examples where it had faded, it was found the fading was due to “insufficient use of galls” rather than to a lack of lightfastness, and that “compounding three parts, by weight, of galls to one of copperas would make the most durable ink.” However, the darker the ink, the more acid it usually was, and inks made with wine or vinegar were even more acidic. The study also showed that the acidity continues to be active rather than evaporating. Perhaps ink made with spring water, which is often alkaline, would be less acidic and less damaging.

I made two batches of ink, one in March and another the following August. I used the same galls, but different forms of copperas. In the March batch, I used dry ferrous sulfate in the amount indicated by the recipe. In the second batch, I used the crystallized form made by Jack Thompson. The copperas in a crystallized state has some liquid with it and weighs more than the dry copperas, so I probably should have reduced the amount I used to make the first batch of ink. When tested for acidity, both were fairly acid, the March ink being pH 2 and the August ink being pH 1.6. Materials with a pH between 6 and 7 are considered neutral. I used both inks in my bestiary and both produced dark black letters. There were, however, instances when letters were not uniformly black on the page. This seemed to occur during the last few weeks I was writing the text, so I wondered if age was the problem. It seems unlikely, though, since the ink was kept in airtight containers and even if it had oxidized over time, such as when in an open inkwell, that would simply turn it very black and not weaken the color. The fact that I emptied my inkwell and filled it from the main airtight container

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95Barrow, “Black Writing Ink of the Colonial Period,” p. 305.
and still had the problem speaks against weakening, too. I was also having problems
with ink flow at these times, and I believe that was a contributing factor. The ink would
flow well but very thickly on the first letter and the beginning of the second, but thin
out quickly thereafter so that I could write only two or three letters at a time between
dipping the pen. This was not only frustrating for writing, but meant that ink coverage
was very uneven, thus producing grey strokes after the initial black ones. The surface
of the vellum might also have contributed to the difference in ink flow. Hair and flesh
sides have different surface characteristics that affect the rate of absorption, as does the
amount of nap. Both these characteristics would vary from skin to skin, and it could
have been coincidence that my ink flow problems occurred during my last few weeks
of copying. I had been having a great deal of difficulty getting any of my quills to write
well at that time, so I put up with the problem longer than I might have otherwise.
Since I was having difficulty writing more than two or three letters at a time, something
I had not encountered earlier, I credit the unevenness of color in my letters to ink flow
caused principally by a poorly trimmed quill, with the difference in the surface of the
vellum being a possible secondary factor.

Quills

There survive no early medieval instructions for cutting a quill pen, probably
because it was such a common task to everyone who wrote. Since the technique has
been passed down by word of mouth over the centuries, what scribes do today is fairly
likely to be close to what medieval scribes did. Besides, the steps known today are so
simple, after some practice, that it is hard to imagine any other way of doing it.

The outer wing pinions of a goose or swan produce the best writing
instruments; Theophilus stated, in the twelfth century, that goose quills were the best.96

96De Hamel, Scribes and Illuminators, p. 27.
If the writer is right-handed, the feathers from the left wing, which have a slight curve to the right, will be the most comfortable to use. The barbs and the thin end of the quill are cut away so that only the central shaft remains; the prevailing modern notion that quill pens had the barbs still attached is mistaken. The feathers must be dry and hard, so they are either left out to dry for a few months or hardened more quickly by a light soaking in water followed by several minutes in hot sand. The thin skin on the outside and flaky stuff on the inside are then rubbed or scraped away. The shaft is now ready to be cut inwards on both sides, and then slit down the middle, so that the quill end looks somewhat like a modern pen nib. The last cut was a small one right at the end to square off the writing surface of the quill.

Medieval paintings and drawings sometimes show that the quill was held in a fashion that varies from our modern method. The common modern method entails resting the area near the point upon the middle finger and having the body of the pen rest somewhere in the space between the thumb and first finger; the thumb and first finger come together, also near the point, to assist in the motions of writing. Christopher De Hamel notes that medieval scribes were depicted as holding their pens much differently:

The medieval scribe, to judge from pictures, held his pen pointing downwards on the inside of the tips of the middle and forefingers while holding it steady by the very tip of the thumb. The fourth and fifth fingers are curled up out of the way. In this way the quill meets the page much more vertically than a modern pen. Ink seems to flow better when a quill is at right angles to the page. The medieval way of holding the quill gives less finger control than a modern pen and so movement comes from the whole hand.97

Almost all paintings show the scribe with a small knife in the hand that does not hold the pen. This would be the pen knife that the scribe used constantly to retrim his quill and to cut a new one. It is fairly common in manuscripts to see where a scribe has

97De Hamel, Scribes and Illuminators, p. 29.
obviously begun writing with a new quill because the letters are often of a slightly
different thickness. He would also have used the knife to scrape off quickly a mistake
before the ink penetrated too far into the vellum. The knife served a third purpose, too,
namely to hold the vellum down where the scribe was writing. Vellum does not
necessarily lie perfectly flat against the writing table’s surface. The vellum must be in
firm contact with the writing table so it doesn’t spring up and down as the scribe
pushes on it with his pen. Any springiness would make for blobs and messy letters.
Even when using paper for modern calligraphy, I and other scribes often use something
to press the paper down close to where we write. An instrument other than the finger is
preferred (on paper as well as vellum) because a finger would leave body oils on the
writing surface as well as moisture that would cause the paper or vellum to buckle.
When doing calligraphy on paper, I use the other end of the brush with which I fill my
pen as the instrument with which I hold the paper down. The one great danger in this is
that in flipping the brush from end to end, it can be dropped, getting ink all over the
written page. However, the medieval scribe with his knife would not have had to worry
about this.

Let me explain about the brush. Quills were not like modern fountain or ball-
point pens in that they had to be dipped into ink to recharge them for writing. While
medieval scribes probably just dipped their pens, many modern scribes use a brush to
fill their pens instead. Modern scribes do not generally use fountain pens. Instead they
use a holder with removable nibs of varying sizes and shapes. Dipping is an
inconsistent way to put ink on a pen since it can be difficult to tell exactly how far into
the ink the pen point is placed, especially as the ink level changes, and to control how
much ink comes up on both surfaces of the point. If there is too much ink on one side
of the point, the writing is likely to start out with a blob of ink, or at least very thick
letters. Loading the pen with a brush lets the writer have control over the amount of ink
on the pen nib.

When I am doing modern calligraphy, however, I am usually using a pigmented ink (one that gets its color by carbon or colored particles) rather than from a chemical reaction, such as that in gall ink. The lack of pigment particles makes the gall ink much thinner and very different in character. In my early experiments, I used a brush to load my quill, just as I would have when doing modern calligraphy on paper. Much to my surprise, though, I found it easier to dip the quill and then touch the underside of the point to the side of my inkwell once or twice to remove excess ink. Since I ended up not using a brush, I used a knife blade to hold down the vellum.

I found cutting quills to be a great challenge. The first issue I had to deal with came up even before I put knife to feather shaft, namely whether or not to heat cure the quills. The practice of curing quills through various methods of heating them stems from the belief that the process makes the quills harder so that they will last longer. Michael Findlay, in his excellent book on writing implements, states:

The clarification and hardening of quills using heat does not appear to have met with general approval much before the mid-eighteenth century, but was nevertheless sufficiently widespread in the sixteenth to cause Palatino to express his disapproval of the practice. Writing in 1540, he advocated the choice of a quill which was already hard and clear, from which the fatty membrane should be scraped away, using the back of the pen-knife blade. [Similar instructions given by several other sixteenth-century writing masters are cited.] It would seem that, among writing masters at least, the natural tempering of the quills through the passage of time, followed by scraping to remove the unwanted membranes, was considered preferable to any form of artificial curing.

I was lucky to be able to evaluate curing by both heat and age. I had seen demonstrated the process by which quills are cured by putting them in heated sand.

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58 There is a black sludge that settles to the bottom after gall ink is made. Advice varies as to whether it should be filtered out or stirred into the ink before each use. However, even when stirred in, these black particles are not what actually gives the ink its color since the black comes from a chemical reaction.

99 Findlay, Michael, Western Writing Implements in the Age of the Quill Pen, Plains Books, Cumbria, 1990.
From this demonstration, I was under the impression that the end needed to be cut off before the quill is exposed to this or any source of heat to allow steam to escape or the shaft might explode. I had ordered from a calligraphy supply source a few quills which were supposed to be already cured, but as the ends were still intact, I called to ask if I had indeed received cured quills. The owner told me the quills were two years old and thus time-cured. They had turned fairly clear, much like heat-cured quills, so I decided to cut them without further preparation. I tried heat-curing on a different batch of quills for comparison. Although I had the proper sand, I decided to use an even simpler method I had learned about from someone in a calligraphy group on the Internet. After cutting the ends off and removing the inside membranes by pulling them out with a very small crochet hook, I simply soaked the quills in water for about four or five hours and put them on the middle rack of an oven (preheated to 250° F) for about twenty minutes, or until the shafts were fairly clear and slightly amber in color. This worked well with no mess, but produced what I found to be a more brittle and hard to trim quill. However, the only quills I had were probably old enough to be considered time-cured. This method of heat curing might well prove valuable for instances where only fresh quills were available.

As for cutting quills, I found it easy to learn and difficult to perfect. Quill shafts vary greatly in shape from almost round to irregular ovals. One must be very careful to place the slit and point at a place on the shaft where it will work well in one’s writing grip or the writer will have difficulty making the broad nib meet the writing surface at the correct angle. In the worst instances of this, I found the pen produced poor strokes and felt very awkward in my hand. Even though I was using a modern grip, my experiments with the medieval grip found the quill tended to roll in my fingertips when the nib was not properly placed. I learned to place an uncut quill in my hand and make strokes as if writing, and then mark the exact top of the shaft for the slit with the quill
still in my hand.

Other variations in quills also contribute to the challenge of cutting a good pen. Quills differ in diameter, thickness and consistency, so that minor modifications in cutting technique need to be made from one quill to the next. According to Donald Jackson,\textsuperscript{100} it should take about one minute to cut a quill. I usually took between ten and fifteen minutes to cut a quill (and I didn’t do the last step which involves making and inserting a reservoir), and as long as forty-five minutes to fine tune it so it would write well. As luck would have it, the first quill I cut was my best. It was the most comfortable in my hand, cut well with the knife, wrote well with little fine tuning, and stood up well to several trimmings. It was an age-cured quill. The heat-cured quills I tried later proved very brittle and difficult to cut accurately, although leaving them in a tall jar with a damp paper towel in the bottom to soften them slightly reduced the brittleness.

Even a simple trimming can change the way a quill writes, a fact I found very frustrating. Several times after trimming a quill, I could not get it to write well at all, and I would end up spending as much as an hour returning it to a useful state. At times I even abandoned quills altogether and switched to a different one. Because of these difficulties, I found myself waiting longer than I might have otherwise before trimming, so the letters in some passages of my bestiary are slightly thicker than is ideal.

I learned some interesting things about moisture absorption in quills. If one begins writing with a dry quill, it becomes more flexible after about ten minutes or so when it has had a chance to absorb moisture from the ink. After continuous use for about two or three hours, I noticed the sides of the point starting to flair out a bit so that

the nib lost some of its original round shape. If left to dry, the point would return to its original roundness. Often, however, when a quill dried out for a day or more, the two sides of the pen point splayed out away from each other. This left a gap in the slit and prevented the ink from flowing to the very tip, making writing impossible without trimming. I tried storing quills nib-end down in a sealed glass jar with a damp paper towel in the bottom. This kept nibs moist and eliminated the initial breaking-in period a dry quill has. But quills left in for more than a day or two swelled and flaired so that they could not be used without trimming. The glass jar proved to be good for short-term storage to eliminate some trimming between writing sessions.

**Miniatures**

Manuscripts had to be carefully planned for all the different elements to be successful. The text was written first, and as it was written, appropriate space was left for the miniatures. This often meant that there had to be at least a sketch of what would be painted so the scribe would know the amount of space and shape that was to be left blank. A light ink or leadpoint sketch was often made in these blank areas to let the painters know what to paint there. When the text had been written, the drawings were sketched in with more detail, often with a light ink, so that the illuminator would know where to place the gold leaf.

As was discussed earlier, the designs of the drawings often came from other sources, and elements were copied from one source to another. If one artist alone was not responsible for the miniatures, then there had to be a master artist who coordinated all the elements, such as how colors were used, how figures were drawn and arranged, and what models would be used, especially when workshops came into being. In my paper comparing the Lambeth and Trinity College Apocalypse manuscripts, which probably date between 1242 and 1250, I show that much detailed planning went into
the background colors of the miniatures in the Trinity Apocalypse. I noticed that

... there was a definite pattern to the colors chosen by the Trinity artists. The Trinity artists were careful to alternate the colors in relation to the other panels on the page, and often extended this system of alternation to the next facing page, when a page was turned, and even within a composite painting.  

Although these manuscripts were made during the end of the period I am considering in this paper, it does show that such organization did exist at that time if not also earlier.

Unlike in a medieval manuscript where the text and miniatures simply took up as many pages as necessary, I have strictly limited myself to five gatherings of four sheets, each sheet being folded in half to give two folios. This gives me forty folios (not counting the end leaves) or eighty pages. Limiting the number of pages made layout critical, especially when it was necessary for each text passage to be preceded by miniatures of various sizes. I had also limited the number of beasts I would include. It was important for me to find out if I had chosen enough to fill the eighty pages or if, perhaps, I had too many. Medieval scribes often worked from a model which would have given them an idea of space requirements. My bestiary, however, is a distillation of the tradition, so the beasts and their order are of my own choosing. Thus I decided to make my own mockup to follow for the placement of miniatures and spacing of the text.

In doing this, I found I had some room to spare and could add a few more subjects of my own choosing. Besides the bear and the amphisbaena, I chose the monocentaur. I had been considering the monoceros because it occurred in several of the bestiaries, but ruled it out because it looked so much like a unicorn. I wasn’t sure if the monoceros, which occurs only in the later bestiaries, grew out of the monocentaur, which occurred only in the early Morgan and Saint Petersburg bestiaries (and the later

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101 Rups, Pamela, An Examination of Two English Apocalypse Manuscripts, an unpublished paper written during my Master’s studies in the fall of 1993, p. 11.
Alnwick derivative), but chose the monocentaur for the variety the image offered and the possible link to the monoceros. The griffin was also chosen for variety. I chose the satyr because it was in all the bestiaries in my study and because it seemed to have a possible strong historical tradition. I suggest this because the image is so similar in all the bestiaries, more so than almost any of the others except the lion. Since most of the bestiaries had some sort of preface material in text if not in miniatures, I chose only the subject of Adam naming the animals because of my limited space. I also chose to shorten the text passages of two subjects, the ants and the Perindeus Tree, because they were repetitive, very long, and in order to include more miniatures, which are visually more interesting.

To establish the order of the subjects in my bestiary (see Appendix), I tried to place them where they occurred in the majority of the medieval bestiaries I studied. When there was no such clear precedence, I went by the order of the older bestiaries. As I was creating my mock-up, though, I found two places where I could not fit the miniature and text in properly without leaving a large gap. For this reason, I put the weasel before the wild ass and the amphisbaena before the viper.

**Drawing the Miniatures**

For the Rups Bestiary, I did sketches in pencil on paper first, copied them to make the lines blacker and, in a couple of instances, to adjust the size, and then traced the drawings in pencil onto the vellum. I had hoped to use some sort of real lead to draw with, and tried such things as fishing weights and hand-cast type. Since nothing I tried was soft enough to produce a mark, though, I used a pencil instead.

This part of the project proved more difficult than I had imagined. On the one hand, I had to stay within the bounds of the medieval bestiary tradition but without exactly copying the existing images. On the other hand, I did have some artistic
latitude, but I had to try to express it from a medieval perspective and style rather than a twentieth-century one. I usually tried to combine some elements pertaining to content or pose from all of the bestiaries, but at times also let the text be an influence to deviate slightly. Let me give some examples.

"Adam Naming the Animals" could be done in many ways. The animals occurred two ways, either in framed groups and appearing to have some sort of organization as to type, or simply scattered in a seemingly random fashion across the page. The St. Petersburg Bestiary has the animals somewhat organized on four hills, but their coloring is very different from those in the other bestiaries. Muratova describes it in this manner:

In the miniature of the Leningrad bestiary [its previous name] the animals’ silhouettes, placed on coloured surfaces in front of Adam, are slightly tinted as if implying that they are just formed "out of the ground" (Genesis 2:19). It is on the pages of the bestiary proper that the animals are given a specific colour as well as the name and other characteristics.102

This intrigued me so much that I decided to use the idea of the animals being pale in color myself. I tinted the animals a very light yellow with sap from a celandine poppy plant in my yard. I determined the grouping and posing of the animals by space limitations and taking something from each of the bestiaries, such as the pose of the rabbit under Adam’s feet from the St. John’s Bestiary. Adam’s pose is echoed by a later miniature featuring the prophet Amos in several of the bestiaries, and I followed that tradition.

In the miniature of the beaver, I drew from the text for a slight change for my image. The miniatures all show a beaver (two in Bodley 764) being chased by hunters for its testicles, which were believed to be medicinal. In the Ashmole, St. John’s, Alnwick, and Bodley Bestiaries, the beaver is biting off his testicles to give to the

hunters in order to save his life. The text states that, if hunted again, this same beaver will stand up to show that it no longer has testicles. This is not shown, but I consider that it would have been within the bounds of the creative license of that time to show it in the miniature, and thus one of my beavers stands on its hind legs before the hunters.

The siren was a very puzzling miniature to deal with. First, there are two “sirens,” one having a female torso and another, near the end of the bestiaries, being a variety of serpent. It would be interesting to find out how this came about. I found the text describing the half-female siren to be confusing in its description of the lower body, and I am apparently not alone since the siren is depicted differently in the various bestiaries. All of the miniatures show the siren having the tail of a fish below the waist, although I do not understand that from the text and my Latin dictionary defines sirens as “mythical birds with virgins’ faces, who enticed sailors by sweet songs and then destroyed them.”103 The Morgan and St. Petersburg Bestiaries give the lower fish extremity bird feet to stand on and wings at the waist, while the related Alnwick Bestiary gives the siren wings and webbed feet. The Ashmole and St. John’s Bestiaries have only the fish tail and no bird parts, and the Bodley has the same, but has put the sirens in the water by a ship. I chose to compromise by having the bird feet but no wings.

Another decision I had to make was how to compose the frames and what size the miniatures should be. I like the tradition where most of the miniatures had regular straight-sided frames and were as wide as the page. There also seemed to be a tradition for about one-half of the birds to be in circular frames in the Morgan, St. Petersburg, and Alnwick Bestiaries, but I didn’t like the irregularities this produced in the text. My solution was to compromise and put the circular frame inside a square frame, as was

done in the St. John's and Ashmole Bestiaries. The Bodley 764 Bestiary used only straight-sided frames.

Illumination

When the miniatures of a manuscript included gold, the gold would be the first element to be applied. This is because the gold could stick to some of the pigment mixtures, although usually only in scattered pieces. Miniatures without gold in them were not technically "illuminated," the principle being that the gold gave a reflected light unlike any paint, and so would "illuminate" a manuscript. But the term "illuminated" is now generally accepted to mean any manuscript that has multi-colored miniatures.

There were three different techniques for applying gold to medieval manuscripts. For one, powdered gold was mixed with a hot animal glue, such as that made from the bladder of a sturgeon, and then placed in a shell, into which the painter dipped his brush and then painted as with a regular pigment, burnishing the area when it had dried.  

This powdered gold is today called shell gold, probably referring to the shell in the medieval directions. But unlike in Theophilus' instructions, the modern artist simply adds water to the gold mixture to use it and does not need to heat it up. In my experience with modern shell gold, it didn’t seem to burnish to as bright a shine as gold leaf. A second method involves making a mixture called gesso, which is applied, sometimes so thickly that it mounds up a bit, wherever the gold is to be placed. When it has dried, a fragile sheet of gold leaf is applied and then burnished. This process can be quite difficult. Even the most minimal draft will carry the thin gold leaf away. Theophilus goes so far as to instruct gilders to hold their breath: "Ea hora oportet te a uento cauere et ab halitu continere, quia, si flaueris, petulam perdes et difficile

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104 Dodwell, Theophilus, p. 28.
reperies." The gold will stick to any oils from the body that have rubbed off onto the page. The humidity must be correct and there can be problems with getting the gold to adhere to the gesso. It is, however, a beautiful way to present the gold, for the small gesso mounds put the gold in relief.

I used a third method, which involves another adhesive called gum ammoniac. This was one of many water mordants used for applying gold in books. This method is simpler and more flexible, and since vellum bends, I prefer to use something I know will not crack. I call the gum ammoniac mixture medieval Super Glue™ because it is very sticky and impossible to wash out of clothing. To make it, I soaked chunks of gum ammoniac overnight in distilled water in a small glass jar at room temperature until they were soft. Then I placed the jar with its contents in a gently simmering pan of water to heat the mixture until lukewarm. I stirred the water and gum constantly with a small wooden stick and also worked to break up the lumps as much as possible. When the chunks of gum had dissolved as much as they would and the mixture was milky and a little thick, I removed it from the heat and let it cool a few minutes before straining it through a triple thickness of women’s nylon stocking. Since the color is so light, the gum ammoniac liquid can be very difficult to see on light surfaces, such as vellum or paper, so I added a very small amount of Indian red powder pigment and stirred well. The addition of a color was common in medieval recipes, which usually specified a kind of red earth called bole. My liquid has been kept in a refrigerator between uses for more than eight years now without there seeming to be any deterioration in performance, provided that it is allowed to stand at room temperature for about a day before use. It is easier to use when thicker, which happened over time.

105 Dodwell, Theophilus, p. 22.
106 Thompson, Daniel V.; the subject of water mordants used in gilding in books is covered on pages 203–210, and gum ammoniac is mentioned specifically on page 209.
107 Thompson, Daniel V., p. 207.
as I left the jar uncovered during various periods of use and some of the water evaporated. Leaving the jar unrefrigerated for three or four months does not seem to reduce its effectiveness, but it can develop a skin of mold. This can easily be removed and the rest of the gum ammoniac used. If the gum mixture stands for a week or more, it settles and collects into an almost solid mass at the bottom of the jar. This can, however, be broken up with a stirring stick and made smooth again with a bit of work.

Applying the gold using gum ammoniac was a simple process. The area to be gilded was painted with gum mixture and allowed to dry. Such an area can be left bare just the few minutes it takes to dry or even a day or two without harm, as long as nothing rests on it. For gilding I used double thickness 23 carat patent gold, which comes on small sheets of paper in a booklet and is much easier to manage in my drafty studio than regular gold leaf. Also, because it is thicker, I usually need to make only one application. Before applying, I cut the gold around an area slightly larger than what would be needed in order to limit the amount that would come off the sheet. I then put my mouth as close as possible to the gummed area, opened it wide, took a deep breath, and gently and slowly breathed onto the area. This must be done gently because you are trying to put moisture from your breath on the gum ammoniac. If your breath doesn't seem to be moist enough, I've been told you can take a drink of sparkling water beforehand to correct this, but I have not had to try this. As soon as I had breathed at least twice on the area, I quickly picked up the paper with the gold leaf and laid the cut-out area of gold over the gummed area, pressing down gently with the fleshy parts of my finger. I then gently removed the rest of the sheet of gold, using a brush to help separate it if necessary. To burnish the gold down I placed a small piece of glassine¹⁰⁸ over the gold and rubbed with a spoon-shaped burnisher. With a brush, I removed very

¹⁰⁸ Glassine is a semitransparent paper with a smooth, shiny surface that is often used by conservators for interleaving items.
small bits of excess; I also used the brush to move larger scraps to a small sheet of paper to save for making repairs on sections that didn’t take the gold the first time. Repairs were done with the same method as above, using scraps if possible. Although it is possible to wait as long as two or three days before applying the gold to the gum ammoniac, I found I needed to do less repair work if I did the gold work within an hour or two of the gum having dried.

Gold was used in two different ways in the miniatures, as an entire background or more as an accent. For my taste, having the entire background in gold leaf, as in the Ashmole Bestiary, did not always produce a pleasing color combination within the miniature. Using so much gold also meant that it became somewhat overwhelming on the page so that it seemed to lose its visual impact. I preferred the method used in the Bodley Bestiary, where the background is partially a colored pattern and partially gold. I alternated between placing the gold in the center area of the miniatures and in the area surrounding the center, although there were a few instances when I wanted the gold in the very middle and had to alter the sequence to accomplish this.

Making the Paints

Medieval painters mainly used two different binders for pigments, namely glair, made from beaten egg whites, and gum arabic, a gum usually obtained from the acacia tree.\(^{109}\) There were many reasons for preferring gum arabic over glair, besides the fact that glair tended to spoil. Daniel Thompson writes:

Glair is rather weak and brittle, especially when newly made, and partly for this reason (which militated against its use in strong concentrations), partly because it was not dense enough to bring out the full quality of some pigments, it was often supplemented in book painting by gum arabic. Gum arabic is a much stronger tempera than glair, and develops the transparency and saturation of pigments mixed with it much more.

\(^{109}\)Thompson, Daniel V., p. 57.
fully.\textsuperscript{110}

In fact, such a preference for gum developed that it replaced glair beginning in the fourteenth century.\textsuperscript{111} Painters often mixed a little sugar or honey with it to keep the gum arabic from becoming brittle, which was important when it was deliberately used in a large quantity to produce a shiny surface.\textsuperscript{112} My own experience with an excess of gum arabic, though, would lead me to consider this an undesirable characteristic. Too much gum arabic does indeed yield a shiny finish to the colors, but I found it also to be somewhat sticky occasionally, especially in humid weather. This would not be good for pages pressed together in a book. At the time, though, I had not added honey or sugar, so this might make a difference, except that honey and sugar are naturally sticky in themselves. I did try using a larger quantity of powdered gum arabic in a couple of my colors, but it made the pigment so thin that it looked streaky and didn’t color well. I also had concerns about the correct quantity of honey to add to prevent the color from becoming brittle so that it would crack or peel off. For both of these practical reasons, and because I personally prefer a matte finish over shiny, I did not use a lot of gum arabic in my colors.

Thompson mentions that the gum used did not always come from acacia trees, and that as long as a gum seemed to function similarly, it was used.\textsuperscript{113} And indeed, Theophilus advises the use of gum from a plum or cherry tree: “Si autem uolueris opus tuum festinare, sume gummi quod exit de arbore ceraso siue pruno.”\textsuperscript{114} Although this is in a section about making colors for painting on wood, he later writes in a section on painting in books: “His ita peractis fac temperamentum ex gummi lucidissimo et aqua

\textsuperscript{110}Thompson, Daniel V., p. 56.
\textsuperscript{111}Thompson, Daniel V., p. 56.
\textsuperscript{112}Thompson, Daniel V., p. 57.
\textsuperscript{113}Thompson, Daniel V., p. 57.
\textsuperscript{114}Dodwell, Theophilus, p. 24.
When making my paints, I used gum arabic as the binder for most of the pigments because it is more flexible, doesn’t spoil, and produces more intense colors. I did not use large amounts of the gum for a shiny effect for the reasons mentioned above. I used a gum arabic solution bought already mixed, but also made a little of my own by crushing the very hard gum arabic chunks into a fine powder and adding the powder as I mixed the pigments. I found that the pre-mixed gum arabic was more likely to produce a paint that went on with streaks and that I could control the consistency more easily with the powder.

Medieval artists used many different types of colors. Some were pigments ground from stones, such as ultramarine and malachite; some were organic dyes from plants, such as sap green and brazil wood; others came from insects, like kermes; still others were the product of chemical reactions, such as salt green and flake white. The two main sources that I have used for original contemporary recipes are De Diuersis Artibus by Theophilus\textsuperscript{116} and a much-copied collection of unknown origin called the Mappae Clavicula.\textsuperscript{117} The earliest known fragment is from the ninth century, but the one from which I worked dates from the twelfth century and is believed to have been produced in England. As another source for further study, Michael Gullick has published an extensive bibliography listing works on medieval painting techniques in chronological order.\textsuperscript{118}

For my Bestiary, I used a deep blue, a medium green, a bright red, a couple of

\begin{footnotes}
\item[115]Dodwell, Theophilus, p. 30.
\end{footnotes}
different browns, a yellow, white, and black. The colors I have listed seem to be the
general palette used in all the bestiaries and, because it is impossible to describe colors
accurately with words, I cannot be more accurate. However, the names of the pigments
I have chosen should help define the colors better.

For my red, I chose a natural vermilion that corresponds closely to one
manufactured in medieval times using sulfur and mercury. The vermilion is made from
vermilion rocks from a mine at Monte Amiata in Italy, which had long been closed until
recently. Because it is terribly expensive, even in as small a quantity as 10 grams, I
have also tried a synthetic modern vermilion. I used a lead white powder purchased
already made because I wanted to avoid the health risks involved with working with
lead as much as possible and because I was concerned about having enough of the
powder since the chemical reaction can take about a month before the first batch is
ready. Lead white can react unfavorably with vermilion, so I also used ground up
eggshells. I was lucky to find a source for this and not to have to grind my own, since
it can take two to three hours to make the shells into a fine enough powder. For green, I
chose malachite as being the most stable and compatible with my other colors.
Verdigris, a very popular medieval green, is an acetate of copper and is sensitive to
moisture and exposure to various gases in the air, both of which can cause it to discolor
greatly and even eat through parchment. Verdigris is also incompatible with flake
white, which I used, giving me a second reason to avoid it in favor of malachite.119

True ultramarine blue comes from ground lapis lazuli and good powder of bright blue is
even more expensive than the vermilion. Again, expense has dictated that I use a
modern synthetic version. Although not as prominent as the other colors, a red-brown
color does appear in some of the manuscript miniatures. I found the browns the most
troublesome to duplicate, especially a cool reddish-brown from the Bodley Bestiary. I

119Thompson, Daniel V., pp. 164–5.
tried to duplicate this particular color with Venetian red earth mixed with lead white, but only with varying success. The color takes a day or more to settle into its final hue and often dried with white blotches. I also used burnt yellow ochre in places, as well as other colors. I recount this in detail in my artist's diary. Even though Daniel Thompson says that the ochres and other browns were not known before the close of the fifteenth century, I was not able to approximate the colors I saw in the reproductions in any other way. For black, I used finely ground vine charcoal with gum arabic and a few drops of gall ink.

Gum arabic, however, cannot be used with vermilion and lead white. For those colors I had to use glair made from egg whites. I made the glair by beating the white of an egg with an electric beater until the froth was very dry and stiff. I then propped the bowl on its side in a dish so that the glair would drain out of the bowl and down into the dish over the next several hours. Beating the egg white like this gets rid of the stringiness so it will mix more readily with dry pigments and water. I also found that storing the glair in a closed jar in the refrigerator extends its useful life to a week or more. But mixing glair into pigments has problems and they differed from the lead white to the vermilion.

I found that the amount of glair one adds to the vermilion greatly affects the color. When the pigment is wet and before it has dried for a day or more, it appears to be a fairly intense reddish-orange color. With only a small amount of glair, however, it ends up drying to a more pinkish hue. The first gathering I painted in my Bestiary was the fourth gathering (ff. 25–32), and the vermilion here is a light pinkish-orange. When I painted the first gathering next (ff. 1–8), I tried adding more glair, and the result is a much deeper reddish-orange color. Because I often have wet mixed pigments left after a painting session, I usually simply let them dry and add water the next time I work.

\[^{120}\text{Thompson, Daniel V., p. 89.}\]
With the vermilion, however, I found it best to add a small amount of glair each time I rewet the color.

Mixing the lead white had its own problems and the glair added to them. Lead white is very difficult to mix into water. I had to work it in my porcelain grinding dish with my small glass grinder for about fifteen to twenty minutes, and that still left a small number of particles floating about. The addition of a substantial amount of ox gall helped a bit (ox gall affects the surface tension of water), but the process was always very time consuming. All the grinding introduced a large number of small air bubbles into the mixture, and adding the glair at this point simply gave me a white that dried with the surface texture of sandpaper. This is typical of air bubbles in a mixture that has glair in it, and the medieval scribe solved this by adding ear wax. I was in short supply, however, so I developed a method to work around this problem. I ground the lead white with distilled water and ox gall until fairly well mixed and then let it dry. To paint with the lead white, I would reconstitute it with distilled water and then add the glair. This method, though, meant that I had to start at least half a day ahead of the next time I needed more white with which to paint. As with the vermilion, I added a small amount of glair each time I reconstituted it thereafter.

All the paints worked differently on the hair and flesh sides of the vellum. The flesh side in general absorbed the colors in a way that made even coverage much easier than on the hair side. And, of course, each piece of vellum varied slightly in surface characteristics, often making painting frustrating, since what seemed to have worked well just a moment before on one miniature, might not work as well on the next.

I had thought that, if some of the dry pigments did not work out, I could just

121 Karen Gorst, a calligrapher and medieval illumination expert in New York, advised me during a telephone call in late November 1996 that it is a common problem for Caucasians, but that people from Asian cultures tend to produce a lot of ear wax and even have an ear wax spoon for dealing with the condition.
use some of my watercolors from tubes as a substitute. Good watercolors in tubes are nothing more than pigment and water and gum arabic (and a little preservative), which should have been similar to what I was mixing up on my own. I found, however, that they did not work well on the vellum, giving only streaky and uneven coverage, especially on the hair side.

As I painted, I kept an artist's diary of the paints I used for each miniature as well as the problems I encountered and other observations about the materials and the process. This record will provide further details not covered in this paper.

The Binding

Although my bestiary is not yet bound, I have gone through the process before on other projects and have already started or completed part of the binding for my own bestiary. I have already spun the flax and done most of the work on the oak boards, and will present my experiences in this part of my paper. For the tasks that remain as yet undone, I will write about my research and explain how I propose to go about completing the binding.

Flax Thread

Flax thread was used to sew the folios of a manuscript together. Flax is one of the family of bast fiber plants, which include jute and hemp, and are known the world over for their long fibers, so long "that they may run the entire length of the plant stem."122 "Linum usitatissimum," an annual plant, grows in a wide range of temperate and sub-tropical areas and has been found in prehistoric sites in Europe as well as in tombs in Egypt dating from over 4,500 years ago. Although the Romans took flax

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spinning and weaving skills to Britain and the rest of their empire, flax was not grown in Britain in large quantities until the seventeenth century because wool was the chief fiber produced there.\textsuperscript{123} Flax was used for certain things, though, and thread for sewing books was one. Archaeological excavation has found examples of thirteenth- and fourteenth-century linen towels, tablecloths, bed coverlets and even intricate embroidery with threads in a variety of colors.\textsuperscript{124} Other remnants of cloth have been identified as probably being linen from as early as the twelfth century in London,\textsuperscript{125} so I think it is safe to assume that, although flax was not in perhaps as wide use as wool and silk, it was in general use during the late twelfth and early thirteenth centuries.

The fibers are found in the bark of the plant and it is a fairly simple process to get at them. The flax I am using was grown in the summer of 1994 in Santa, Idaho. The first stage of flax treatment was retting, a process in which fermentation of wet flax is encouraged in order to free the fibers from the rest of the plant material. This was done outdoors in a bathtub in the middle of a fine vegetable garden, after which the flax was allowed to dry thoroughly. Nothing else had been done to it until I worked on it in July of 1995.

The first step was to remove the plant husks and non-fibrous materials. This I did using a very simple wooden machine similar to something that could have been used in medieval times or before. This device consists mainly of three long wooden sticks, all pinned together at one end loosely enough so they move up and down easily (lower part of Figure 12). There is a small gap between the two outer sticks so that the center stick comes down just slightly between them. The center stick is brought up and several dry flax plants are laid across the two lower sticks; the center stick is then

\textsuperscript{123}Cook, p. 5.
\textsuperscript{125}Crowfoot, Pritchard, and Staniland, p. 81.
brought down repeatedly onto the flax stems, so that the brittle husks are broken into little pieces. This process is called breaking; scutching follows this. To scutch, I used a piece of wood that is flat on one side and has a handle at one end. The plant stems that had gone through breaking I now hit with the flat side of the scutching tool to remove the broken pieces of straw. The bundle of long fibers that remained after scutching still had some impurities and was tangled, so I pulled the fibers through wooden combs with teeth of progressively smaller sizes, which is called hackling. I stopped this when all the fibers were aligned and the straw removed. The process is much the same in modern flax production except that machines do all of these things.\textsuperscript{126} By hand, it is not at all a difficult process and actually goes fairly quickly.

The next step was to spin the flax into thread to sew with. For this I made a

\textsuperscript{126}Cook, pp. 8–9.
drop spindle to spin by hand. A spindle has a long narrow shaft with a weight (whorl) at the bottom. As the thread is spun, it is wrapped around the shaft; the weight of the whorl gives momentum to the spin of the spindle (Figure 13). To make my spindle, I

![Figure 13. Spindle Used for the Rups Bestiary.](image)

used a 3/8 inch diameter wooden dowel for the shaft and a round piece of wood one inch thick. In the center of this disk, I drilled a hole for the dowel to go through. Before inserting the dowel, I rounded the bottom of the disk by carving with a knife, and then I sanded the wood smooth. I also rounded off the top of the dowel so there would be no sharp edge for the thread to catch on and carved a notch completely around the tip about 1/2 inch from the rounded end. I then inserted the dowel in the hole in the weight disk until it protruded about 3/8 inch. Mine was a very snug fit, but should it be loose,
glue could hold the shaft in place.

Before I began to spin, I tied a light string about two thirds of the way down the shaft and pulled it down over the weight, once around the small protruding end of the shaft, and back up to the top of the shaft. I next tied a half hitch around the notch at the top, pulled the string out from this and cut it off about six inches away. I then separated a small bunch of flax fibers from my main bundle and tied the string around one end of these fibers. With a small bowl of water nearby, I was now ready to begin spinning.

Spinning is tricky and takes some practice, but I was able to become adequately proficient with a few hours of practice. Spinning with wool fibers is a little easier, so it might be a good idea to practice the technique with wool before going to flax. Since I am right-handed, I will describe the procedure from that perspective.

Standing up with the bowl of water on a stool within easy reach, I held the unspun flax pinched between the index finger and thumb of my left hand; the spindle was hanging freely down in front of me. I wet my hands and the fibers in my left hand with the water from the bowl. Making the fibers wet makes the twist set in them as they dry. It also helps the fibers stick together as you join the ends. With my right hand, I reached down and set the weight spinning clockwise. I then picked up a very small bundle of fibers with this same hand and brought it up above my left hand so the loose ends were hanging down right above the ones held in my left hand. I found it best to hold the flax in the last three fingers, leaving my right thumb and forefinger free. As the spindle spun, I overlapped the fibers in my left hand slightly with a few hanging down from my right and made sure they were wet so they clung to each other. I then raised my right hand up a few inches, and pulled most, but not all of the fibers up to thin out the amount that would be spun. I pinched these fibers between thumb and forefinger, and let go with my left hand. This allowed the spinning spindle to twist the section of fibers I had just overlapped. When they had twisted adequately, which varied according
to the speed of the spinning spindle, I reached my left hand up to the fingers of my right hand, pinched the thread just below that, and repeated the process with periodic pauses to set the spindle spinning again. When the spindle had dropped almost to the floor, I stopped and made sure that all the thread I had just made was moist, rewetting it if necessary. Then I unhooked the thread from around the spindle and wound it around the lower third of the shaft, and rehooked it around the spindle to start the procedure again. After the very first length was spun, I removed the light string before winding the flax thread around the shaft. I am fairly short, so to lengthen my spinning sessions I stood either on a bench, on stairs, or some other place where my spindle could hang down a bit further before I had to stop and wind the thread up. Once I established a rhythm, the less it got broken, the faster and easier it was to spin. The thread was then left on the spindle or wound onto a spool or card to dry.

There was one more step to be completed before the thread was ready for sewing a manuscript. To help keep the stray ends together and to make the thread smoother and easier to pass through the small holes in the vellum, it had to be waxed. I used a small cake of beeswax that can be purchased from hive keepers, sewing stores and bookbinding equipment suppliers. Holding the wax in the palm of my left hand and one end of the thread in my right, I placed the end closest to my hand on top of the cake of wax and pressed my left thumb down gently on top of it. I then pulled the thread over the beeswax to coat it. This was done at least two or three times, but not so many that the thread was heavy and very stiff with wax. It was very important to make sure the thread was pulled over the wax towards the spindle, too, or it would unwind, making the thread much weaker and very likely to break. So I had to watch closely to see that the thread wasn’t unwinding and also that the fibers weren’t being pulled into wads and clumps, all of which indicated I needed to wax the thread from the other direction.
Flax thread is very strong, even when quite thin. I was finally able to produce a fairly thin thread, but the thickness varied a bit. The few samples of medieval flax thread I have seen, though, also had thicker and thinner areas. The only place my thread tended to be weak was where the ends of the fibers were joined. If this area of the thread was not adequately twisted together, the thread broke while I was sewing. The ends of the fibers sometimes also stuck out at these joins and caught in the holes and bunched up, which kept me from being able to pull the thread all the way through or even sometimes caused the thread to break at that point. The only other reason for the thread breaking was if the fibers were simply not twisted enough.

Wooden Boards

The wooden boards used for manuscripts in twelfth-century England were almost without exception made of oak,\textsuperscript{127} and since this practice probably continued even after that period, my boards are also made of oak. They were quarter-cut out of sections of logs, not plank cut across the log. This means that, instead of making several parallel cuts across a whole section of log, wedge-shaped pieces were cut.\textsuperscript{128} Quarter-cut wood is less subject to warping and splitting. These wedges were then trimmed of the inner sap wood and outer cambium layers and planed flat (Figure 14).

The white oak that I used for my boards came from a large tree harvested in 1989 and 1990 from a vineyard in Oregon. The trunk was cut into sections, which were then split into several wedge-shaped pieces so they would dry out better. These sections of oak were occasionally turned in the five years of drying and not subjected to great fluctuations or extremes of temperature.


I split a piece of this white oak for my boards, first using a froe and a large heavy mallet made from tree roots. The froe had a long metal blade about two-and-a-half feet long with a handle at one end; the sharp side of the blade points away from the handle. The handle was shorter than the blade and served simply to position and steady the instrument on the piece of wood being split. The mallet looked like a very large turkey drumstick and was made from the area of the stump where the roots meet the trunk. In this part of the tree, the grain of the wood swirls around and the wood is very dense and heavy. This meant that the weight of the mallet assisted in providing power for splitting the piece of oak and the swirling grain meant the mallet itself would not split from hard blows.

The piece of oak I used was about eighteen inches tall and about fourteen inches wide, and the boards I needed were to be about 10 3/4 inches tall. This would hopefully allow enough extra area so that, after trimming away the sapwood and cambium, I could still find two pieces where the grain was fairly straight and there were no small splits. The piece of oak being split was stood upright on a stump (grain running up and down), and the froe blade was positioned on top of it with the sharp edge on the oak where I wanted to split it. While someone else steadied the froe by its
handle, I raised the heavy mallet over my head and brought it down as hard as I could on top of the froe blade. On the first try, the froe blade was not pushed into the oak, and the mallet just bounced off. But on the second attempt, the froe blade sank into the oak and began to split it. The froe was now stuck in the wood, and so, by picking the froe up by the handle, the blade could be forced further down the piece of oak simply by pounding it on the stump. When this no longer made progress, the protruding end of the blade was hit with a smaller mallet until the split was clean. I was very lucky with my splitting in that it was fairly straight and smooth. This is not always the case because one often can’t tell from the outside surface of a piece of wood what checks (small cracks) and flaws are hidden inside. The wood was split again until I had two pieces of roughly the same thickness, about one inch thick.

Before doing more, I used a hatchet to cut away the sapwood that had been in the center of the tree and the outside cambium layers that had been just under the bark. Both of these areas have a slightly different color than the main part of the wood, so I could see where I needed to trim to have only the dense inner wood left. Then I examined both surfaces of my two pieces of oak to determine where would be the best place to cut out my two boards. The boards were going to be good-sized, so it was difficult to find a large area with no flaws and fairly straight grain. The splitting had also exposed some hidden internal checks that I wanted to avoid, as well as some twists of the grain that were not desirable. After determining where my boards would be cut out, I sawed some wood off the ends, leaving me with pieces still somewhat larger than the finished dimensions. This gave me less area to flatten and plane.

The next step was to make the boards flat and smooth. Since the oak was fairly rough and uneven after being split, I used a tool that is like a hatchet except that one side of the blade is flat. This lets the user chop with the blade parallel to the wood’s surface to make shallower cuts when necessary. Medieval workers could have used a
similar tool or a chisel; either would work well. With this tool, I worked on getting rid
of the biggest ridges and humps, making both sides as flat and as parallel to each other
as I could. This took more skill than I had, and I needed assistance with this step. I
found there was a real trick to using the hatchet and not getting your thumb or knuckles
pinched or badly scrubbed when making shallow cuts.

Now the boards were ready to be planed. I clamped them to a table and began
planing the top surface smooth, judging by eye what areas needed to be reduced. To
make final adjustments, I laid the edge of a metal square (a tool for squaring; any tool
with a straight edge could be used, such as a ruler) on top of the board, first up and
down and across, then on both diagonals. Seeing daylight beneath the edge of the
square revealed a low spot between two higher areas. I would then use the plane to
make corrections. I went back and forth between planing and checking with the straight
edge until I was satisfied that I had made the board as flat as I could. There were areas
on the very ends or sides that were just slightly lower, but these would be trimmed off
eventually, so I didn’t worry about them. I was quite amazed at how accurately I could
work with only these simple tools. When the side of the board was as smooth as I
could get it with the plane, I used a metal wood scraper to make it even smoother.129

The process for the opposite sides of each board was much the same, only consistency
of thickness was also taken into account when planing. I left the boards thicker than I
thought I would need them so that I could determine their final thickness after I had
sewn the gatherings together. This way I could be sure the boards would be of a
thickness that would feel and look right with the thickness of the text block.

The planing was done in July 1995 and the boards were stored in a cooler and

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129 This scraper is a piece of steel with two long flat edges, one angled for coarser scraping, the other
straight for fine scraping. Metal scrapers give the wood its final smooth finish and are used by fine
craftsmen instead of sandpaper. I made this scraper myself, along with two knives, two wooden folders
and a bone folder. But since this is a sideline to the main topic, I will not explain the process in this
paper.
hopefully not too humid area (or too dry in the winter) in my basement studio. I tried to keep the boards from extreme temperature and humidity changes and I did not store them under any pressure. In this way, they should have done most of any remaining twisting before being bound to the manuscript. Oak is very acidic; the vinegar-like odor of acetic acid was very noticeable on my freshly split boards even after having been dried out for five years. This acidity will, of course, adversely affect whatever it comes in contact with, so another reason I planed my boards so early was so they could sit for at least six months and lose some of their destructive chemicals. Conservator Jack Thompson has a theory that perhaps a neutral layer or “scab” forms on the outside of bare oak that is left to sit for a long time. Therefore, I did not do my final planing for thickness on the side of the boards that would be on the inside of the manuscript.

As it happened, the boards developed a slight concaveness over the two years that elapsed between this part of the work and the time for doing the final shaping. Instead of planing the inside surface flat and then doing the same with the outside, I have decided to leave the curve in the boards upon a suggestion made by Jack Thompson. Since the outward curve occurs in the middle of the boards and runs from top to bottom, the boards on the closed book will exert less pressure down the middle of the pages where the miniatures are. This has an advantage, since the paint and gold on the many miniatures will add thickness to the middle of the gatherings and the concave boards will help to compensate for this when the book is closed. Less pressure on the miniatures will reduce the likelihood of damage when the book is fastened closed.

When I then shape the outside edges of my boards, I will use a plane with the grain, and a file or rasp across the grain. Graham Pollard has found four basic shapes for the edges of boards: (1) a simple square, (2) the chamfer, (3) the bevel, and (4) the

130From a workshop given by Jack Thompson in Idaho in July 1995.
cushioned bevel (Figure 15). This last type is usually found on bindings with a rounded back and thus is of the later fourteenth century. The plain square edge is mostly found on bindings from before the middle of the twelfth century, which means that my own binding, simulating a binding that might have been from around 1230 or later, has to have either chamfer or bevel boards. My own preference is for the bevel shape, because I prefer the way it feels in my hand as well as the way it looks.

![Square, Chamfer, Bevel, Cushioned bevel](image)

Figure 15. Four Types of Medieval Board Edge Shapes.

Another small detail noticeable on boards of this period is that the corners were sometimes cut off right by the head and tail, probably to make it easier to work the headbands. I will do this easily and quickly with a file. I will also carve the grooves and holes for the thongs and headbands and the recessed areas for the brass closure fittings, all of which is discussed below. The holes for the thongs of the endbands, though, will be made after the endbands are done. The four main endband thongs will then be laced into the boards to see how the endbands fit, unlaced, and then the holes will be drilled. I plan on using a hand drill, but a medieval worker would have used a

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gimlet,\textsuperscript{133} according to Graham Pollard.\textsuperscript{134} Christopher Clarkson also mentions drilling in regard to the tunnels made in twelfth-century boards, but gives no further details on the tool that would have been used.\textsuperscript{135}

**Sewing Supports and Sewing Pattern**

I do not know positively what sort of needle was used for sewing manuscripts at that time. It could easily have been bone, but there is also evidence of metal needles being made of iron in the late fourteenth century.\textsuperscript{136} Although this is later than the period I am dealing with, I do not put it out of the question that something similar could easily have existed earlier, knowing the state of the metal arts at that time. My needle was made out of a very small gauge steel rod by Jack Thompson while I watched. A short piece the length of two needles was cut off and heated in the middle until hot. This hot middle area was then beaten on an anvil with a hammer until flat, which also made that area wider. With a punch, a small deep dimple was put on either side of the center point and the piece of steel rod was cut in two, making two needles. I then filed the dimple flat and just slightly more, which opened up a hole, making the eye of the needle. I used a file to put a sharp point on the other end of the needle and to smooth the top and the eye of the needle. It was, of course, important to smooth out the eye because sharp edges here would cause the thread to snag and break.

The method for sewing onto bands\textsuperscript{137} and lacing into boards provided for a flat

\textsuperscript{133}A gimlet is a hand tool that looks like a corkscrew, but which is sharp, so that twisting drills a hole in the wood.

\textsuperscript{134}Pollard, “The Construction of English Twelfth-Century Bindings,” p. 10. Pollard writes that there is a picture of a monk using a gimlet (left side, second from top) in the Bamberg manuscript, which shows various stages of book production. However, it seems more likely to me that the tool is a stylus for writing on wax tablets. The Bamberg page can be seen in: Dodwell, C. R., *The Pictorial Arts of the West: 800–1200*, Yale University Press, New Haven, 1993, plate 318.

\textsuperscript{135}Clarkson, Christopher, “English Monastic Bookbinding in the Twelfth Century,” p. 188.

\textsuperscript{136}Crowfoot, Pritchard, and Staniland, p. 151.

\textsuperscript{137}Pollard, Clarkson and others use the terms band, slip, band slip, and thongs interchangeably, all to denote the sewing support.
spine until some time in the first half of the thirteenth century, when raised bands began to be seen. The twelfth-century style of binding was different from earlier ones in the way the bands went through the wood and were fastened. The earlier method was to make tunnels in the thickness of the board through which the bands were passed until they came out into a groove on the inside of the back and front boards.\textsuperscript{138} The pattern of the grooves was such that the head and tail bands angled inward to join the middle bands, where they were twisted together, pushed into grooves, and pegged into the boards. By the end of the twelfth century and on into the beginning of the thirteenth, the bands still entered holes in the thickness of the boards, but they were no longer linked and twisted together before being pegged.\textsuperscript{139}

For my sewing supports, I will use single bands of alum-tawed pigskin, a very tough material, and will cut a slit down the middle of the bands approximately as long as the textblock\textsuperscript{140} is thick. Alum-tawed skins were used until around the sixteenth century because they were stronger than tanned leather.\textsuperscript{141} Medieval binders are known to have used a sewing frame, a wooden device with two uprights that hold a moveable


\textsuperscript{140}I am using the binder's term "textblock" to refer to all the folios put together for the book, not the area occupied by the text on a page.

\textsuperscript{141}Clarkson, "English Monastic Bookbinding in the Twelfth Century," p. 194.
horizontal bar.\textsuperscript{142} This device holds the bands in a vertical position so that gatherings may be placed with their folds against the taut bands to make sewing easier. The leaves were organized usually in gatherings of four bifolia, each one folded in half to make eight folios (sixteen pages). The needle and thread went through a small cut in the fold of the folio and then out and around each side of the split band in the pattern shown in Figure 16. The next gathering was placed on top of the one just sewn to the bands and a stitch known as the kettle stitch was used at both ends to join the gatherings together.

Figure 16. Diagram for Sewing Onto Thongs.

The most common sewing pattern in the twelfth century, though, was the herringbone,\textsuperscript{143} which differed in that the thread from each gathering was linked to the

\textsuperscript{142}Dodwell, C. R., *The Pictorial Arts of the West: 800–1200*. Yale University Press, New Haven, 1993; plate 318 shows stages in manuscript production, with a sewing frame shown in the picture second from the top in the right column.

\textsuperscript{143}Clarkson, “English Monastic Bookbinding in the Twelfth Century,” p. 185.
one below it at each sewing station (where the gathering attaches to the band). Christopher Clarkson has also observed another method he terms helical sewing. This uses a separate thread for each sewing station, so that, unlike the preceding sewing patterns, there is no thread in the fold connecting one band to the next. The thread winds only around a single band until all the gatherings are connected to that band.\textsuperscript{144} But since my manuscript is from a later transitional time, I will use the method shown in Figure 16.

Even though my manuscript is fairly large, it will have only four bands, plus the head- and tailbands, since the number of bands was kept to a minimum until the end of the thirteenth century. During the thirteenth century, the number of bands gradually began to increase, and it became the fashion to have more bands than were necessary structurally to support the textblock, sometimes as many as ten or eleven.\textsuperscript{145} The reason for this could be because it was noticed that over time the bands always eventually broke at the hinge; so the number was increased in an attempt to correct this weakness. Actually, I also think that the raised bands became an element in the design and they increased in number as everything else about books also became more elaborate. In the twelfth century, most manuscripts were sewn onto two bands, seldom on three, and almost never on four; the bands were always slit and never rolled.\textsuperscript{146} My four bands will all go through a groove cut in the top edge of the board instead of a tunnel, a new development as of around 1230. Pollard states that this was a time-saving method, since the grooves could be quickly cut with a saw.\textsuperscript{147} I have attempted to do this with a saw, but could not succeed, so perhaps I don’t understand how he envisions the use of the saw. I usually use a wood chisel and other carving tools to make the grooves and

\begin{footnotesize}
\textsuperscript{144}Clarkson, "English Monastic Bookbinding in the Twelfth Century," p. 186.
\textsuperscript{146}Clarkson, "English Monastic Bookbinding in the Twelfth Century," p. 185.
\end{footnotesize}
channels. It takes me a lot longer than for a medieval binder because I am personally more committed to neatness and a tight fit than many twelfth-century binders were. In describing twelfth-century book boards, Clarkson writes, “The carpentry is usually not as neat as in previous centuries, and as the twelfth century progresses, earth fillers seem to be employed more and more often to smooth out or fill in the cuts in the board.” Indeed, even in later boards I have often noticed that the grooves were only roughly cut.

The holes for the endbands will be drilled before the bands are laced onto the boards and pegged. These tunnels in twelfth-century books usually ran in a straight line at a 45° angle from the corners towards the center of the book. I will also carve out two areas, one in the front cover to recess the brass strap fastener and a second in the middle of the back cover for the brass fitting with a pin in the middle.

At about the same time that grooves at the spine came into use, the place the pegs were put also changed. Before grooves, the pegs all occurred in a straight line vertically down the board. But with the advent of grooves at the spine and as the number of bands began to increase, the position of the pegs alternated between closer and farther from the spine. There were some structural concerns connected with tunnels, grooves and pegs. It could not have been easy to drill a straight hole about one or two inches long, and getting the band through that small opening must have taken a good deal of time. The groove on the top edge could have been quicker to make and definitely made threading the band much easier. But this groove also created a weak point in the board, a place where the wood might snap. Pegs lined up vertically could also create a weak area, especially the closer they were together. The peg holes would act something like a perforation for tearing paper, especially since they would usually

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be lined up with the grain of the wood. As the number of bands increased, the pegs got closer and closer together, and presumably staggering the position of the pegs was an attempt to solve this problem of structural weakness.

Tabs and Endbands

Until probably around the middle of the thirteenth century, books had tabs that extended from the spine of their bindings. Christopher De Hamel writes of books with tabs: "They were probably kept in chests with the fore-edge downwards. The edges of the boards were flush with the pages so that it was a neat fit. The title was visible on the spine. The tabs were for lifting the book out of the chest." Books were not stored upright on shelves as they are today. Bookmarks were also attached to these tabs and will be discussed below.

Endbands (headbands and tailbands) in the twelfth century were usually sewn and had a thick piece of leather beginning at the kettle stitch and extending to the endbands and a bit beyond. This piece of leather was sewn on when stitching the endband, and also served as part of the tab. It was usually a different color than the leather of the binding and was often lined with a piece of colored, woven silk. This tab stiffener fit between the outside cover leather and the folded backs of the folio gatherings, and the silk cloth showed on the inside of the end-tabs. Single endband cores were made of twisted flax, rolled pink leather, or tanned leather, and wrapped in white thread that was separate from the decorative stitching. Such endbands were common from the middle of the thirteenth century until the fifteenth century, although there is evidence that this style was used much earlier. Most twelfth-century

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endbands were sewn on double bands. The decorative sewing for the headband itself was usually done with a white thread, but often was alternated with thread of another color, such as yellow, red, blue, or green. There were various patterns of sewing, and, on occasion, the functional sewing was oversewn with a decorative cross-stitch.\footnote{About double endbands, colored threads, and the cross-stitch: Pollard, Graham, “The Construction of English Twelfth-Century Bindings,” pp. 12–13.}

Although most headbands were sewn, Pollard did discover one that had been made by wrapping hemp thread around a piece of rolled puce leather with no decorative sewing on top of it.\footnote{Pollard, “The Construction of English Twelfth-Century Bindings,” p. 3.} The cores for headbands of this time were either flax cord, or rolled tanned or pink leather. I used leather I had pared thin and to which I applied wheat paste before rolling it up.

The patterns I will use for sewing the endbands and finishing the tabs are adapted from some shown for eleventh- through thirteenth-century manuscripts in a book published by the Bibliothèque Nationale.\footnote{Bibliotheque Nationale, Les Tranchefiles Brodées: Étude historique et technique. Bibliothèque Nationale, Paris, 1989, pp. 14–25.} Although the patterns shown are for French manuscripts, such techniques were probably widely transmitted and subject to personal creativeness. The thread used for such sewing was fairly thick and often simply uncolored flax. The book has examples from original manuscripts showing white thread and several showing a very dark blue. I also plan to do some decorative sewing around the hole in the tab at the head. The hole will be for attaching a bookmark. A more common method of attaching a bookmark, according to Pollard, was to have it sewn into the headband or the edge of the tab.\footnote{Pollard, “Describing Medieval Bookbindings,” p. 62.} But since I think this will be much more difficult for someone with as little experience as I have sewing medieval endband patterns, I plan to use the more simple method of threading the markers through the tab hole. Some bookmarks were as simple as a plain leather thong:
others were devices that moved up and down a leather thong to mark the line, and which had a disk that could be rotated to designate the column. Christopher Clarkson described one to me that was several cords knotted together at one end only so that the free ends could all be used as markers. From his studies, Pollard has concluded that bookmarks were considered an essential part of the binding. My Bestiary has only one column of text, so there is no need for a column number indicator. I plan to make my marker of several long fingerloop braids made with silk, all knotted together at one end to keep them from slipping through the hole in the tab.

Covering

Full Leather Binding

It is difficult to say what type of leather was used most often on medieval books of the twelfth and thirteenth centuries. Leather was made out of almost any animal skin to hand, including seal and dog, and it can be very difficult to identify the animal origin of a piece of leather. Pollard states that leather used for bindings could be produced by three different processes: tanning, whittawing (alum-tawing), and tawing leather staining it pink. The tanned leather was used only for the blind stamped bindings. Alum-tawed leather was soaked in a solution of lime, alum, and salt, and turned out off-white in color; most twelfth-century bindings and bands used leather that had been processed in this manner. The third type, the pink leather, was simply alum-tawed leather that had been colored with kermes, a red dye produced from insects. I think we must be very careful when viewing such things today, because such dyes are not lightfast and colors often deteriorate over time due to the conditions under which they

157From a personal interview with Christopher Clarkson on August 17, 1995.
159Crowfoot, Pritchard, and Staniland, pp. 138–140. This section shows a diagram of loop braiding with five loops.
were used and housed, chemical changes, and exposure to light. My experience as an artist with pigments and my concerns about the archival quality of my materials has made me very aware of these issues. Cheryl Porter has also addressed this issue, saying, "The colors that we see now when we open a manuscript may not be the same as those that were originally applied." So to say that the leather was pink implies to me that the original color was more likely a bright red. And indeed Pollard admits that the pink leather is sometimes vivid red on the turn-ins, where it would have been protected. Unlike tanned leather, the color on alum-tawed leather remains on the surface, and so could be easily rubbed off in time. Pollard found that this pink leather was used mostly for lining pieces (such as for tabs and spines, described earlier) and fastening straps around the beginning of the thirteenth century, but seldom used for covers until the period 1250–1350.

For my binding I will use a tanned red goatskin. I have found it difficult to obtain kermes to dye an alum-tawed skin, and after talking to Rick Cavasin, who has experimented with dying skins, I have decided it is more than I can take on for this project. I also want something that will be more durable. Kermes dye on an alum-tawed skin stays on the surface and is susceptible to abrasion. The color I have chosen, red, is authentic. My book will have a tab at the head and tail, with a hole in the tab at the head for a book marker. In spite of these older characteristics, I had planned on having raised bands on the spine in order to show a possible mix of older and newer techniques that might have existed in this transitional time in binding. Having raised bands would mean there would be no spine liner between the kettle stitches so that the

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covering leather would adhere directly to the bands and the folds of the gatherings.\textsuperscript{163}

But my gatherings are few (only five) and rather thick, and, after much consideration, I have decided that the raised band construction would not let my manuscript open properly. I now plan to use a spine liner of soft tawed leather that will cover the spine between the tab stiffeners and extend onto the front and back boards, where it will be pasted down. This will not only be better structurally, but will also let me demonstrate the older twelfth-century binding method which is less familiar to people.

Pollard calls what I think of as tab stiffeners “liners,”\textsuperscript{164} and describes what I think of as the spine liner as simply an extension of the “liner” at the tabs. I find his use of one term for what I perceive to be two very different things confusing. I agree more with Christopher Clarkson, who uses the terms “tab stiffener” and “spine liner” as two separate items.

A spine liner was constructed in various ways. Sometimes it was cut the width of the spine and extended along the spine between the tab stiffeners, in which case it is often sewn onto the tab stiffeners. This type of liner comes between the covering leather and the bands so that the entire spine is protected from any contact with the wheat paste on the covering leather. In some cases the liner was cut slightly wider than the spine, possibly so that it could be pasted to the edges of the boards.\textsuperscript{165} Some spine liners did not cover the bands and were simply individual strips of leather protecting the spine between the bands.\textsuperscript{166} Each piece would have been only as wide as the space between the bands and would extend past the outer edge of the spine far enough to be pasted down onto the inside of the boards. In this case they could be put on after the boards had been attached by simply threading the lining strips around the spine to the

\textsuperscript{163}Pollard, “Describing Medieval Bookbindings,” p.61.
inside of the boards with the book opened slightly, and then pasting them to the inside of the boards. Another type of spine liner consisted of one or more pieces of leather which covered the bands on the spine and extended far enough sideways to be pasted down on the insides of the boards. Slits were cut to allow the bands to pass through and attach to the boards.\textsuperscript{167} I plan to use this last type of spine liner. It will cover the entire spine of my manuscript between the end tabs and I will slip it over the spine and paste it down after the boards have been attached.

To cover the book, I will place the book spine downwards onto the middle of the wrong side of the leather so that the book's spine is on top of the spine area of the leather, and mark the head and tail. The spine area on this skin is fairly noticeable, so I am lucky that the skin is large enough to have the grain run up and down, instead of having the spine area run across the middle of the covers. Without picking the book up off the leather, I will then lay it down to the left and mark the edges of the board, roll the book back up onto the spine, and lay it down to the right, again marking the edges of the board. I then will measure 1 3/4 inches away from the outside marks for the turn-ins, which allows for the thickness of the boards as well as enough to fold over to the inside of the boards. At the head and tail of the spine, I will draw a half circle for the tabs and cut them out, but not cut any of the corner miters. Then I will pare the leather for the turn-ins so they will fold over more easily and not be so thick on the inside of the boards.

In folding the leather over to the inside of the boards, there are many problems in trying to cope with corners so that they are well covered by the leather (Figure 17). An early technique, from the Anglo-Saxon sewing tradition that lasted into the twelfth

century, was to miter the leather\textsuperscript{168} and carefully sew the angled edges together on the underside so that the stitches didn’t show. This method did not use paste to attach the cover.\textsuperscript{169} An uncomplicated method that did use paste was simply to lap one mitered edge slightly over the other, but this was often crudely done.\textsuperscript{170} A later development involved leaving an extra “tail” that was folded over the mitered area to make sure the wooden corner didn’t stick out and that there was no gap at the join; when this technique was used, the mitered corners were not sewn together, but pasted down. This is somewhat bulky, though, no matter how carefully it is done, and tends to

\begin{itemize}
  \item Mitering is a technique where two pieces of a material are cut at an angle so they will fit closely together, such as when the boards making up a wooden frame are cut at 45° angles so they fit together tightly and form right angles at the corners.
\end{itemize}
produce a slightly rounded corner rather than a clear, sharp one. A still later binding technique added little tails on either side of the spine. Figure 18 shows the way I cut my skin for the cover.

![Diagram of leather cutting](image)

Figure 18. How the Covering Leather Was Cut for the Rups Bestiary.

To adhere the leather to the book, I plan to cook a paste of water and powdered wheat paste. When this has cooled, I will use a brush to cover the back side of the entire piece of leather with the paste, using the brush to work it into the skin. I will then let the leather sit with the paste on it for between ten and fifteen minutes to soak the leather and make it uniformly wet. I must monitor how the skin darkens with moisture so I can work more paste into areas that do not seem to be wet enough. I will then place the book, with its spine down, on the spine markings I made earlier on the leather, press the book down onto the leather, and roll it carefully over onto the back cover, pressing down again. Next I will gently roll the book back onto its spine, holding the
leather onto the back cover with one hand, and roll it onto the front cover, and press
down again. I will then pick up the book and gently work the leather around the spine,
molding it with my fingers. Still with my fingers, I will make sure that the edges
around the boards are sharp and that there are no bubbles in the front or back covers. I
will then place a piece of paper over one of the covers to protect the wet leather from
bruising. Using the flat edge of a bone folder, I will then gently scrape from the center
of the board outwards to each of the three edges, but not towards the spine. This
removes small bubbles and excess paste. Any paste that is squeezed out is removed.

Now will come the tricky task of making the miters at the corners. I will cut
each miter only as I work on it, using the miter method with “tails” and folding over the
turn-ins before pasting down the “tails.” A bone folder is essential for making the
corners sharp, working excess paste out of the turn-ins, working the “tails” over the
corners, and flattening them as much as possible. From experience I know I will need
to refresh the paste in unworked areas in which the paste is no longer moist enough.
The last step will be to make sure the spine tab has been pasted well to its lining at the
head and tail.

When I have completed this last step, I will check for other areas that might
need a little more work. My book will now be ready to dry under weight, but before I
do this, I will slip a piece of waxed paper between each board and the text block to keep
as much moisture as possible from moving from the leather to the vellum. On a
pressboard I will place several sheets of newspaper as padding and to absorb moisture.
I will then lay the book on the center of this, place several more sheets of newspaper on
it, and top it with a second pressboard. This “book sandwich” will be put into a press
and a fair amount of pressure applied, but not so much as to wrinkle the leather at the
spine. Too much pressure could also damage the miniatures. After about half a day in
the press, I will change the newspapers and return the book to the press. After another
six hours, I will change the newspapers again and leave the book in the press for 24 hours. By this time, the book should be fairly dry so that I can finally open it very carefully. I will not open the pages a lot at this time, but for the next few weeks, whenever I am not working on the book, I will still leave it under a bit of weight, even after the clasps have been made and mounted.

After the book has dried for a few days, I will sew a decorative stitch around the tab edges and the hole in the tab at the head. In early twelfth-century manuscripts, the endleaves were part of the text block, whereas later in the century they began to be an additional part. Because my manuscript is a learning tool, I will not paste the endsheets down onto the insides of the boards so that the spine liner, grooves, pegs, and leather turn-ins will remain visible.

The leather with which I plan to cover the book would be ideal for blind stamping. Unfortunately I have not been able to find any tools with images that would be appropriate for the time period I am considering. Examples of stamps used in the first half of the thirteenth century are: the Virgin and child enthroned, the kneeling Elder, David playing his harp, an ox (St. Luke), the eagle (St. John), the lion, the griffin, the dragon, rosettes, and leaves.

Chemises

Chemises were leather coverings that fit snugly, without paste, over bound manuscripts. A piece of leather had pockets sewn onto the inside for the boards to be tucked into, and was large enough so that it wrapped around the sides and fore-edge

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like a protective skirt. Chemises were put on plain boards as well as leather-covered boards and were often eventually attached permanently by the addition of bosses (discussed below).  

If the binding had a strap, it went through an opening in the fore-edge of the top pocket and extended to the back board, where it fastened on a pin. The end of the strap often had a tassel or pull of some sort attached to it so the fastener could be pulled off the pin. Such a construction meant that although a skirt extended off the upper board of the chemise on the top, bottom and fore-edge, it did not do so on the fore-edge of the bottom board, so that the strap could wrap to the back.

Romanesque chemises had narrow skirts and were made of heavy tawed leather. The outside edges of the chemise were covered by sewing a thin strip of skin around them. Later medieval chemises had skirts wide enough to wrap around the entire book or even be gathered together at the tail to make a girdle book. They were also made of thinner, more flexible leather or textiles. Sheppard, in writing about twelfth-century monastic bindings, says of the term “primary covering” that it “... acknowledges the probability that the book was once also provided with a second covering of a thicker material, often also of skin, for protection.” Making a chemise out of textiles seems a very natural thing to do, and although I have not read of any thirteenth-century cloth chemises being found, I do not think that lack of such evidence means they might not have existed, since textiles are extremely fragile. The cloth chemises would have born the brunt of the wear on the outside of manuscripts and been the first thing to be replaced. The only reason we have evidence that end tabs were lined with silk is because they were reinforced with longer-lasting leather, and even with this aid the silk exists today often only as very delicate fragments. Because I think a cloth

chemise is plausible and because of the expense of a leather chemise, I have chosen a red and gold brocade cloth for my chemise.

The pockets into which the boards were tucked were separate pieces of skin sewn onto the main piece so that the boards would fit snugly. Timothy Graham has informed me of a chemise he saw where the pocket was made by folding the fore-edge of the skin over and simply sewing this flap together at the top and bottom edges.\textsuperscript{176} This would work very well because the lower fore-edge was typically without a skirt anyway and it would also eliminate having to cover the raw edge of the skin on that side.

\begin{center}
\textbf{Figure 19. Chemise Construction for the Rups Bestiary.}
\end{center}

Since my chemise will cover a book bound in leather with a closing strap, the strap will come out of the upper pocket at a gap in the seam and wrap around to the lower board (Figure 19). The lower side of the chemise will have a hole for the pin to

\textsuperscript{176}From a conversation with Timothy Graham in January 1996.
stick through and the strap will attach to this. I like the method for making the lower pocket that Mr. Graham observed and will use that because it makes a neat edge for the strap to pass over. The drawing in Christopher Clarkson's article\textsuperscript{177} shows that the strap was fastened to the skirt; but since I want to be able to take the chemise off, I will not do this, nor will I put bosses through the chemise and attach them to the boards, as was often done. The last step will be to sew a long narrow strip of covering material around the outside raw edges of the chemise.

\textbf{Clasps and Bosses}

The clasps and bosses of medieval manuscripts were functional rather than merely decorative. Bosses are small protruding structures attached to the outside covers to protect the binding from surface abrasion during use. On precious bindings with metalwork and valuable jewels, this was especially necessary. Bosses also made it easier to put a hand under larger books when lifting them. The bosses could be raised metal decorations attached at the corners of both the top and bottom covers and also appeared in the middle of the cover. On jeweled covers, the projecting stones were often placed so as to function as bosses and protect the metalwork on the covers. However, according to Mowery,\textsuperscript{178} bosses were not often used on books made in England. As book production increased so that books were more frequently smaller and used in private libraries without the space available in larger monasteries and universities, the need to be able to place books closely together on shelves precluded using bosses, which thereafter appeared mostly on liturgical manuscripts.

Clasps also performed a protective function. From the earliest time when vellum was used as the writing surface, the codex structure was designed to keep the pages

\textsuperscript{177}Clarkson, "English Monastic Bookbinding in the Twelfth Century," p. 184, Figure 1.

flat. By sewing the sections together at the spine, using stiff wooden boards, and fastening the boards together with a clasp, the hydroscopic vellum was kept confined and flat. Hydroscopicity refers to the tendency to absorb and release moisture. With vellum this means that the pages of a manuscript would buckle and cockle according to the humidity of its surroundings. Without the confining codex structure with clasps, the vellum would no longer be flat after a time, making the folios more difficult to turn over, allowing dust between the pages, and making the manuscript thicker and unwieldy.

Clasp decoration was usually done by inscribing, using punches, hammering (chasing), or embossing. An early method for closure was simply a strap, in some cases not even attached to the book, which was wrapped around the boards a few times with the end then tucked under one of the wrappings. It is fairly easy to date early clasps since before the twelfth century they were usually made of iron. Some time in the twelfth century, brass became the preferred material. In England, there was usually only a single clasp. A strap was attached to the front board and had a metal fitting with a hole in it on the free end. The strap pulled around to the back cover and the hole in the strap fitting went over a pin embedded there (Figure 20). The brass fitting at the end of the strap often had a tassel attached to a ring. Having the strap fasten to the back cover would have made it awkward to use the book, because the protruding pin would prevent the back board of the book from lying flush with any surface. In spite of this, the practice persisted, and longer in England than on the continent. In the fourteenth century the single strap was increased to two, and the clasps no longer fastened in the middle of the back cover, but on the fore-edge. Whereas in the preceding period

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179Mowery, p. 10.
180Mowery, p. 12.
England was known for having a single strap, Italy and southern countries had at least two. Italy, Spain and sometimes France were other countries where the strap was on the front and wrapped around to the catch on the back cover. The opposite was true for books produced in Germany, the Netherlands and elsewhere.\footnote{Mowery, p. 23.} It was in the thirteenth century that clasps began to be decorated by engraving and stamping and files were used to bevel the edges.\footnote{Mowery, p. 15.} Most of the straps were made of leather or leather wrapped around vellum, the latter type having survived in the largest quantity.\footnote{Mowery, p. 27.}

My brass fittings and strap will be mounted after the book has been covered with leather. I will use thin sheet brass for my fixtures and brass rod for my rivets and a thicker rod for my pin. I will draw out the designs first on paper before I cut the pieces out. I will need a flat fitting to act as a background to surround the pin, another flat fitting to hold the end of the strap to the front of the book, and a third flat fitting that will be bent around the free end of the strap. This will have a hole in the underside into
which the pin will fit and a small ring on the end for a pull tassel. The shapes will be
made by filing, and after the outlines are done, the edges will be given a bevel with a
flat file to finish them off. I will slightly round the head of the pin and make a notch
less than 1/8 inch below that for the strap fitting to catch on. I will make the rivets by
cutting off a short length of thin brass rod and placing it in a hole I have drilled in a
piece of soft steel. This will hold the rod steady as I use a small hammer to pound first
downwards on the end of the rod, and, after a small burr has formed, to hammer at an
angle to create a mushroom-like cap on the rod. To fasten the fittings to the boards, I
will use a hand drill to drill small holes through the fittings and the board at the same
time. I will then place a rivet through from the outside and repeat the hammering
procedure to form a cap on the inside of the board. I will do the final hammering on the
inside so as not to damage the brass fittings on the outside. For the pin on the back, I
will first rivet the fitting in place in its recessed area before I drill by hand a large hole
through the fitting and down part-way through the oak board. I will then put the pin in
the hole so it sticks out far enough to catch the hole in the strap fitting when the strap is
pulled around the book, mark the rod, and cut the pin off the end. If the pin does not fit
tightly enough in the hole, I will put a little glue in the hole to be sure it stays in place.
The strap should fit so snugly around the book that the book needs to be compressed
slightly in order to unfasten the strap from the catchpin.

Conclusion

This project has accomplished both specific research and a gathering of various
techniques from diverse and widely scattered sources into one place. Through this
project, I have done original paleographical research in which I discovered five scribes
in the first part of the Morgan Bestiary and produced an original table comparing the
letter forms in six Bestiaries. Another original table compares the contents of the same
Bestiaries, which includes corrections to the listings in some earlier publications. I have also been able to record my own personal experiences with medieval techniques, recipes, and tools in this paper and in an artist’s diary (to be published later), and focused this wide range of information into the making of my own bestiary in a style and manner that I feel represents what could have been produced in the early thirteenth century. I have painted and will later bind my bestiary with examples of what was typical as well as unusual in order to use it as a teaching tool in conjunction with my written work.

One of the goals of this project was to assemble in one place the steps involved in making a medieval manuscript, specifically one from England in the early thirteenth century. The making of medieval manuscripts has already been covered by several writers in a very general way, but not with the many practical details necessary for someone in the present time to duplicate the process. Of course binding methods, writing styles, and painting methods and materials were specific to countries and time periods in certain details, but most of what I have written has fairly wide applications.

In particular, the practical issues of painting on vellum proved to be the most difficult aspect of this project and the part with the least amount of written material available. One of the more surprising things I learned was how colors change their appearance over time, even a short time. Most artists are used to the fact that colors look different when they have dried, sometimes markedly so. But I noticed that certain colors also changed subtly over the course of only a few days or weeks. Scholars have discovered that colors change over long periods of time, and perhaps this discovery of short term changes will help in understanding the way things actually appeared to the artist and how he or she worked with color in medieval times. Some of the problems I encountered, such as in the mixing of lead white, paint not flowing well off my brush, the difficulty of painting with a dry brush, and how time-consuming it was to paint a
miniature, should help future artists or conservators who try medieval techniques and give scholars a new understanding and appreciation for the process.

The techniques I have written about are being practiced today and taught in workshops by dedicated binders and artists who have done years of research and learned from others who have passed traditions and information down orally. Having learned from this oral tradition, I have, in my thesis, put down details that I have not found in writing in any publication or assembled as a cohesive whole, so that the entire process of making a medieval manuscript can be examined in a practical manner and more fully appreciated and understood by scholars, binders, artists and conservators. This will also, hopefully, aid to spread my conviction that every part of a manuscript carries important evidence for scholars needing to trace a book’s origin or analyze miniatures, or seeking to learn more about other aspects of medieval life; for conservators wishing to preserve the manuscripts; and for artists wishing to expand their range of materials and techniques.
Appendix A

Subjects in the Greek Physiologus
Subjects in the Greek Physiologus

1. Lion
2. Lizard
3. Caladrius
4. Pelican
5. Owl
6. Eagle
7. Phoenix
8. Hoopoe
9. Onager
10. Viper
11. Snake
12. Ant
13. Siren and Onocentaur
14. Hedgehog
15. Fox
16. Panther
17. Aspidochelone
18. Partridge
19. Vulture
20. Ant-Lion
21. Weasel
22. Unicorn
23. Beaver
24. Hyena
25. Hydrus
26. Ichneumon
27. Crow
28. Turtle-Dove
29. Frog
30. Stag
31. Salamander
32. Diamond
33. Swallows
34. Peridexion Tree
35. Doves
36. Antelope
37. Fire Stones
38. Magnet
39. Sawfish
40. Ibis
41. Goat
42. Diamond (again)
43. Elephant
44. Pearl and Agate
45. Onager and Ape
46. Indian Stone
47. Coot
48. Amos and the Fig Tree
49. Ostrich
Appendix B

Subjects in the Rups Bestiary
Subjects in the Rup's Bestiary

1. Adam Naming the Animals
2. Lion
3. Panther
4. Antelope
5. Unicorn
6. Griffin
7. Elephant
8. Beaver
9. Hyena
10. Ape
11. Satyr
12. Stag
13. Wild Goat
14. Bear
15. Centaur
16. Fox
17. Weasel
18. Wild Ass
19. Hedgehog
20. Ants (abbreviated)
21. Eagle
22. Vulture
23. Swallow
24. Caladrius
25. Pelican
26. Owl
27. Phoenix
28. Phoenix
29. Hoopoe
30. Ibis
31. Coot
32. Partridge
33. Partridge
34. Dove
35. Turtledove
36. Ostrich
37. Crow
38. Perindeus Tree
39. Amos the Prophet
40. Amphisbaena
41. Viper
42. Hydrus
43. Siren
44. Lizard
45. Salamander
46. Snake shedding
47. Firestones
Appendix C

English Bestiary Manuscripts From 1066–1385 A.D.
1. Oxford, Bodleian Library MS Laud. Misc. 247 (S.C. 1302), c. 1120 A.D. This manuscript belongs to James’ First Family category of Bestiaries.


3. London, British Library MS Add. 11283, c. 1170 A.D. Although the drawings are unframed, as in First Family manuscripts, the expanded textual material places it in the Second Family.

4. New York, Pierpont Morgan Library M 81, c. 1185 A.D. Illuminations typical of Second Family, but because of the lack of several chapters, McCulloch places it in a transitional group between the First and Second Families.


9. Cambridge, University Library MS II. 4. 26, c. 1200–10 A.D. Unusual in that most of the illustrations are mostly line drawings without tinting or painting, a twelfth-century tradition. Text is of the Second Family type.

10. Oxford, Bodleian Library MS Ashmole 1511, c. 1210 A.D. Based on the Aberdeen Bestiary, but more complete and belongs to James’ Second Family.

11. Oxford, St. John’s College MS 61, c. 1220 A.D. Based on a manuscript of the Second Family, although the iconography is similar to manuscripts of the transitional type between the First and Second Families. Includes Temptation and Expulsion scenes not occurring in earlier Bestiaries.
12. Cambridge, Fitzwilliam Museum MS 254, c. 1220–30 A.D. Contains a rare Map of the World of the Crates type and implied the existence of the Antipodes, disputed by the Church. James placed this manuscript in his Third Family.

13. Cambridge, University Library MS Kk. 4. 25, c. 1230 A.D. Incomplete version bound with other texts. Classified by James as belonging to the Third Family. Unusual in that it includes the Antipodes.


16. London, British Library MS Harley 4751, c. 1230–40 A.D. Expanded version of the Second Family, including such rare chapters as that of the barnacle geese.


18. Alnwick Castle, Collection of the Duke of Northumberland MS 447, c. 1250–60 A.D. Almost an exact copy of London, British Library MS Royal 12 C. XIX. Begins with a series of creation scenes. Transitional between First and Second Families. NOTE: Since Nigel Morgan catalogued this manuscript in Early Gothic Manuscripts [II] 1250–1285, it has come up for auction at Sotheby’s in November of 1990. According to Christopher De Hamel, it was purchased by a private party. A condition of the sale was that a microfilm of the manuscript be placed in the British Library, but in September 1996, I was informed they were unable to locate a record of it.

19. Cambridge, Trinity College MS R. 14.9, ff. 89–108, c. 1260–70 A.D. Bound with several other texts from the twelfth through fifteenth centuries. Illustrations from both the First and Second Families.

21. London, Westminster Abbey Library MS 22, c. 1270–90 A.D. Has 165 framed miniatures. From James' Third Family. Lion is not the first creature described: the ox is.

22. London, British Library MS Harley 3244 ff. 27–71, after 1285 A.D. The bestiary is bound together with Peraldus' *Liber de Vitiis*. The scenes are a variant of the Second Family, with some being interpolated from the Third Family. Opens with a scene of a Knight doing battle with the Vices.

23. Canterbury, Cathedral Library MS lit. D. 10, c. 1300 A.D. Many illuminations in various stages of completion, space left for a further thirty-three. Classification unsure, illuminations more extensive than James' Second Family, but doesn't fit Third Family.


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