

**Audubon's *The Birds of America*:
A Technical Examination and Condition Survey of the
Four-Volume Folio Set Belonging to Syracuse University**

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THESIS

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Note: In 2006, this publication was scanned from an original copy of the thesis,
and the main text has been slightly revised by the author to correct matters of fact.
In the new Appendix F is information about the provenance of the set in the
Special Collections Library of the University of Michigan Library.

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PREFACE

Audubon's *The Birds of America*, reproduced after his original drawings in engraving, etching and aquatint, and hand colored in watercolors, is a celebrated work of art inspired by one man's lifelong love of nature. My initial work on the set belonging to Syracuse University was to be a conservation condition survey. However, as the survey progressed, it became apparent that there were many questions about the dates of publication, the techniques used to reproduce the images, and the differences between this set and others, all of which needed to be formally addressed.

Equally important was the question of provenance. The history of the set, prior to 1896 when it was given to the University by the Hon. James J. Belden, was unknown. While it was relatively easy to determine when the set was printed, how it was printed, and with which kinds of materials it was printed, the information concerning the provenance was not bound up in each page.

The final identification of the previous owner of the set before Belden, who turned out to be Dr. Haller Nutt of Natchez, Mississippi, and many other aspects of the thesis could not have been determined without the help of several people. I would especially like to thank Mark Weimer, Rare Book Librarian of the George Arents Research Library and the staff for their invaluable help in carrying out this project. Thanks must also be made to Tamara and Jonathan Thornton who shared additional information about Dr. Haller Nutt, together with Dan Kushel and F. Christopher Tahk for their understanding and support during the research into and writing of this thesis. Gratitude also goes to Margaret Holben Ellis who supplied a sample of Whatman paper, which was used to test several of the analytical procedures eventually used to determine various components of the paper upon which *The Birds of America* were printed.

In February 2009, I gave a talk about *The Birds of America* as part of the University of Michigan Library's new series of monthly lectures. To prepare for this presentation, I read books that have been published since my thesis, and these references have been included in the bibliography. The UM Special Collections Library's copy of the double-elephant folio was the first purchase made for the Library in 1839, shortly after the publication ended in mid-1838. Information about that purchase is included in Appendix F. Many thanks to Peggy Daub, Director of the S.C.L., as well as Kathy Beam and Marcy Toon for all their help.

CHAPTER I

HISTORICAL BACKGROUND

Biographical introduction

Jean Rabine was born on 26 April 1785 in the port city of Les Cayes (now, Aux Cayes) on the island of Haiti. His parents were Jean Audubon and his mistress, a Mademoiselle Jeanne Rabin. His natural mother died soon after his birth. His father, a sea captain and planter in the New World, rescued his six-year-old son during racial uprisings in 1791, taking him to Nantes, France. There the young Rabine was eventually adopted by his father and his wife, Anne Moynet Audubon.

Even as a small child, Rabine was intrigued by birds, nests, eggs and plants. He was never good at formal studies, and only read books on natural history. Often he was absent from school, preferring instead to collect plants, lichen, pebbles and the like. A short stint at a naval academy only proved that Audubon would never make a good sailor—he suffered chronic seasickness. Fortunately, the opportunity arose to send him to America so that his illegitimacy could be kept secret, and so that he could assume the Audubon name.¹ He was eighteen when he reached his parents' plantation at Mill Grove, Pennsylvania, and it was there that Jean Rabine became John James Audubon.

For the next twenty-three years, from 1803–1826, Audubon spent a majority of his time hunting and studying the many native birds. He made numerous sketches and ornithological notes. Legend has it that it was not until 1810 that the idea to publish his bird studies was planted in his mind through a propitious meeting with the Scottish ornithologist, Alexander Wilson, who very nearly sold Audubon a subscription to his illustrated bird book, *American Ornithology; or the Natural History of Birds of the United States* (1808–1814). Audubon quickly realized that his own drawings were superior to Wilson's, and from that point on, Audubon's dream to publish *The Birds of America* became his ambition.

Over the succeeding decades, Audubon developed a drawing technique that perfectly suited the painting of birds, especially the feathers. He often painted the birds in watercolor, and then added pastel, chalk and crayon over areas where a soft "feathery" effect was desired. For areas where more sheen was required, he seems to have used a glaze, probably glair, or egg white.² He employed several other artists (who were also family or friends) to paint some of the backgrounds. These included Joseph Mason, George Lehman, Maria Martin and both of his sons, John Woodhouse and Victor Gifford Audubon. In early drawings, these backgrounds

¹ Alice Ford, *John James Audubon* (Norman: University of Oklahoma Press, 1964), 37.

² New-York Historical Society, *The Original Watercolor Paintings by John James Audubon for the Birds of America*, 2 vols. (New York: American Heritage Publishing Co., Inc., 1966), 1:xxiii.

consisted primarily of branches, scenes on rock ledges or undergrowth. Later drawings included views of such places as Charleston, South Carolina, and Cohoes Falls, New York.

Subscription and distribution of *The Birds of America*

After failing to locate any support for the publication of *The Birds of America* in Philadelphia in 1824, Audubon set out for England in May 1826. He spent the first few months of his visit with relatives in Liverpool and Manchester, publicly exhibiting his drawings. These exhibits generated quite a bit of interest in his artistic endeavors. At the suggestion of F. S. Brookes, the American consul in Manchester, he decided to start a subscription list. This practice of soliciting subscribers to pay for the publication of a limited edition was quite popular in Europe at the time.

In order to enrich his subscription list, Audubon wrote to several prominent personages asking for permission to include their names without obliging them to purchase the work. These included Charles Lucien Bonaparte and his father-in-law, Joseph Bonaparte (erstwhile King of Spain), DeWitt Clinton, Henry Clay, General Andrew Jackson and General William Clark.³ Audubon was optimistic about *The Birds of America* enterprise. In an early letter to Lucy, he promised her that he “cannot at present conceive failure on my part and May God grant that it may be true. If I can procure in the whole of 2 years 300 subscribers we will be rich indeed.”⁴ The total number of subscribers probably did not exceed 200.

Audubon wanted to set his work apart from publications like Wilson’s *American Ornithology*, particularly with regard to size. Audubon drew all of his birds for publication to life size. He wanted the printed birds to be the same. However, H. G. Bohn, a noted London bookseller, advised Audubon to abandon this idea because

to have your book be laid on the table...if...it needs so much room as to bring shame on other works or encumber the table, it will not be purchased by the set of people who are the very life of the trade...[it] ought not to exceed double that of Wilson’s [a quarto, about 14 inches high].⁵

It is very interesting to note that, when Bohn actually saw Audubon’s life-size drawings, he immediately changed his mind and urged publication, “full size of life, and that they must pay well.”⁶ Shortly after, on 30 October 1826, Audubon was introduced to Scottish engraver and

³ Letter to C. L. Bonaparte, 22 October 1826; quoted in Waldemar H. Fries, *The Double Elephant Folio: The Story of Audubon’s Birds of America* (Chicago: American Library Association, 1973), 7.

⁴ John James Audubon, *The Letters of John James Audubon 1826–1840*, ed. Howard Corning, 2 vols. (Boston: Club of Odd Volumes, 1930) 1:13. Letter to Lucy, dated 21 December 1826.

⁵ John James Audubon, *The 1826 Journal of John James Audubon*, transcribed by Alice Ford (Norman, Okla.: University of Oklahoma Press, 1967), 176. Entry dated 29 September 1826.

⁶ *Ibid.*, 200. Entry dated 10 October 1826.

printer, Mr. William Home Lizars of Edinburgh. Audubon's journal entry dated 19 November 1826 states, "It was settled by Mr. Lizars that he would undertake the publication of the first Number of my Birds of America."⁷

The Birds of America were to be issued in Numbers (Arabic numerals) consisting of five Plates each and included would be land, water and shore birds. (While the Plates are numbered in Roman numerals throughout *The Birds of America*, Arabic numerals are used throughout this thesis.) The first Plate in each Number was to be a large size image, almost filling the sheet that measured about 38.5 x 26.5 inches; the second, a medium size; and the last three, small-size Plates.

Audubon's original plan for promoting the work was to exhibit the Plates in Numbers as they were issued, and to this end, he eventually carried with him bound copies of *The Birds of America* together with the prospectus. By the middle of 1827, Number 1, Plates 1–5 had been printed and colored under Lizars's supervision, and Audubon issued a prospectus announcing the work. A copy of what is thought to be the earliest printed prospectus is in the library of the American Philosophical Society in Philadelphia. In addition to other descriptive information about *The Birds of America*, it states,

There are upwards of four hundred Drawings, and it is proposed that they shall comprise Three Volumes, each containing about 130 Plates, to which an Index will be given at the end of each, to be bound with the Volume.⁸

In fact, at the conclusion of the publication in 1838, there were 435 Plates containing 457 species of birds "plus one hybrid and five so-called birds of mystery..." usually bound in four volumes.⁹ The typical composition of these volumes is: Volumes 1, 2 and 3 each with 100 Plates and Volume 4 with 135 Plates. Audubon, in fact, did not have drawings of four hundred different species prepared before the publication began. He stated in a letter to his son, Victor, on 14 January 1834 that "[it] would prove a most wonderful thing if the 4th Volume does contain 100 pates. You are afraid of New Species coming in—I am greatly afraid of the want of them."¹⁰

Additionally, an index was never printed for any of the Volumes. Audubon had intended, early on in the publication, to print title pages and tables of contents, but he decided against the latter.¹¹ Subsequently printed prospectuses included the names of the subscribers

⁷ Ibid., 255.

⁸ Fries, *Double Elephant Folio*, 387.

⁹ Susanne M. Low, *An Index and Guide to Audubon's Birds of America* (New York: Abbeville Press Publishers, 1988), 13.

¹⁰ Audubon, *Letters*, 2:6.

¹¹ Ibid., 1:132. Letters to Robert Havell, dated 12 March and 23 March 1831.

and reviews of the publication.

The price of the subscription per Number—five Plates—was two guineas (two pounds £, two shillings), about \$9. The first subscriber was Dr. Meikleham of Trinidad, although he discontinued in 1828. The first American subscriber was Miss Harriet Douglas of New York. Audubon continued exhibiting the Plates as they were published throughout the years 1826–1840 until the last full bound set was sold for \$1100.¹²

As the prospectus stated, the Numbers were sent to each subscriber as they were completed and were either paid for in advance or upon receipt. Other subscribers preferred to wait until all the Numbers in a Volume were ready, and then they arranged with Audubon or his agents to have the Volume(s) bound and delivered. Prices for a volume of loose Plates or bound sets were as follows:

	England	United States
Volume of Loose prints	£42–0–0	\$189
Volume, Half-bound	£49–10–0	\$225
Volume, Full bound	£52–0–0	\$234 ¹³

The distribution of *The Birds of America* was a fairly complicated procedure. Originally, the loose Plates in Numbers were to be “delivered in Tin-cases, to preserve them from injury; and it would be advisable for the Subscribers to procure a portfolio in which to keep the Numbers till a Volume is completed.”¹⁴ There are a few references to these ‘Tin-cases’ in Audubon’s *1826 Journal and Letters*, and it seems that there may have been two types of containers: tin tubes, which would have held perhaps one or two Numbers, and tin or wooden crates, which would have contained more than a few Numbers and perhaps bound copies.¹⁵

Throughout the publication, Audubon never ceased to have problems with subscribers who either never paid on time or withdrew their subscription. In the end, there were approximately 175 completed sets that were delivered to subscribers who had paid in full. Apparently, very few individual Plates were sold as Audubon insisted that in order for a person to have even one Plate, he must pay for them all. However, as evidenced by the letter below, damaged Plates were sold individually or as job lots.

As stated above, Numbers were issued as loose sheets, or the subscriber could elect to have the Plates bound. It seems that the printer arranged for this binding, and that binding firm seems to have been Hering’s of 9 Newman Street, London.¹⁶ In 1834, Audubon makes reference

¹² *Ibid.*, 2:232. The letter is to Rev’d. John Bachman, dated 15 February 1840.

¹³ Fries, *Double Elephant Folio*, 387.

¹⁴ *Ibid.*

¹⁵ Audubon, *Letters*, 2:95. Letter to Havell, dated 1 October [November] 1835.

¹⁶ Duff Hart-Davis, *Audubon’s Elephant* (London: Weidenfeld & Nicolson, 2003), 127.

to a Mr. and Mrs. Robinson of Leeds who were engaged in binding some of the volumes, but it is not known whether they shared the work with Hering's or were the earliest binders to work on the project.¹⁷

As subscribers were located throughout Europe and America, they often had to wait months for Numbers, or years for bound volumes originating from London. Audubon sailed back and forth between England and America and wrote many letters to his son, Victor, who was his agent in London, asking him to ship Numbers or volumes to him or subscribers. Audubon's frustration regarding delays is keenly felt in excerpts from these letters to Victor. For example,

I wish you had forwarded *first Volume* bound as you had these on hand, as several would have been delivered & paid for ere this had been the case. do send them all or whatever of them that may be ready as soon as possible.¹⁸

This day the Nos 34 & 35 for this City [Charleston] and for Columbia College have arrived in Port—but I have not seen them yet.—All the Nos by the [ship] President were *Wet* & good for nothing.—These have been sold at auction in New York and *have I* been vexed enough on that account.¹⁹

As the average duration of a transatlantic voyage by ship was one month, it is surprising that the publication and distribution of *The Birds of America* was not beset with more problems than it seems to have been.

The Birds of America engravers: Lizars and Havell

Once Audubon settled on the dimensions of *The Birds of America*, he went in search of an engraver who could undertake the publication. In November 1826, he settled with William Home Lizars to print and engrave the Plates. Lizars started immediately with the first Number, which included the famous Plate 1, "Wild Turkey." About it, Audubon wrote, "It was concluded that the Wild Turkey Cock should be the large bird of my first Number, to prove the necessity of the size of the work."²⁰ In fact, many years later, Audubon was still not pleased with his drawing of the first plate. In a 15 September 1835 letter to Havell, he wrote, "I have a notion to have the Wild Turkey reengraved in your present finished state of work, and I can make a fine Drawing from them [turkey skins] and my old soiled one [original drawing]."²¹

While Lizars was printing the first two Numbers (ten Plates), Audubon was traveling throughout England to sell subscriptions. However, in early June 1827, Audubon received news

¹⁷ Ibid., 2:39. Letter to Mrs (Lucy) Audubon, dated 22 September 1834.

¹⁸ Ibid., 1:274–275. Letter to Victor Audubon, dated December 1833.

¹⁹ Ibid., 1:274–275. Letter to Victor Audubon, dated December 1833.

²⁰ Audubon, *1826 Journal*, 275. Entry dated 4 December 1826.

²¹ Audubon, *Letters*, 2:91.

from Lizars that his colorers had gone on strike and that work was at a standstill.²² Audubon was in London when he received this terrible news, and he immediately began looking for a firm that could undertake the coloring of the Plates. In a letter to Lucy, dated 6 August 1827, Audubon wrote,

I was forced last week to write him [Lizars] to forward me the *coppers engraved* here to have the Impressions printed and colored here. I received the whole [Numbers 1 and 2?] yesterday in good order and I am truly glad for it, for London affords all sorts of facilities imaginable or necessary for the Publication of such immense work and hereafter my *Principal* business will be carried on here—I have made arrangements with a Mr Havell an excellent Engraver who has a good establishment containing Printers—Colorers and Engravers So that I can have all under my eye when I am in London and no longer will be stoppd by the want of Paper, or Coppers that Mr Lizars was obliged to order from here.²³

“A Mr Havell” was Robert Havell, an engraver of considerable reputation, who had a shop at 79 Newman Street, London. A story that Waldemar Fries relates in his comprehensive work on *The Birds of America*, tells how the massive job of undertaking the publication of the Plates was initially refused by Havell because of his advanced years. However, the master printer agreed to look around for a younger engraver who could work under his supervision. As fortune would have it, the man chosen turned out to be Havell’s estranged son, Robert Havell Jr.²⁴ Father and son were reconciled and work commenced. Havell Jr. engraved the copper plates while Havell Sr. supervised the printing and coloring. This arrangement seems to have continued until 1830, after which time, Havell Jr. alone supervised all work until its completion in 1838.

In a 6 August 1827 letter, Audubon stated that, when he compared the coloring of the Plates done by Lizars and by Havell, “the [latter’s printing] work is quite equal, and the sets colored by him far surpassing in beauty those of Mr L.”²⁵ In addition, the price that Havell was prepared to charge Audubon was approximately £25 less than Lizars for one hundred sets of one Number (500 plates). For these, Havell charged Audubon £114–16–0, which included the copper plates; the engraving, printing, and coloring; one ream of paper (500 sheets); and the “tin cases” to send the Numbers to each subscriber. The prices quoted by Havell in 1827 were kept in effect until 1838 when the work was finally completed.

The publication proceeded as follows. The original drawings were given to Havell from which the copper plates were etched, aquatinted and engraved. Interestingly, in his journal, Audubon stated, “I had seen some artists of Mr. Lizars coloring by gas light, printing on copper,

²² Fries, *Double Elephant Folio*, 23.

²³ Audubon, *Letters*, 1:29–30.

²⁴ Fries, *Double Elephant Folio*, 24–25.

²⁵ Audubon, *Letters*, 1:30.

&c., &c., for the first time in my life!"²⁶ A few days later after another visit to Lizars's shop, he wrote,

I was glad to see how faithfully copied they [the drawings] were done, and scarcely able to conceive the great *adroit* required to form all the lines in a sense contrary [in reverse] to the model before them.²⁷

In an essay on Audubon, Charlotte Hilton Green implies that the drawings were traced and transferred onto the plates so that the engravings were accurate.²⁸ If this was indeed the case, either the drawing would have had to have been placed facedown on the top of the copper plate to have the outlines incised into a soft etching ground; or a tracing could have been made from the drawing. However, either technique would have caused some damage to the original drawings, which were done in friable media such as pastels, chalks and crayons. The best way to verify whether a tracing technique was used would be to examine the original drawings in the collection of the New-York Historical Society for any such evidence.

No matter whether the design was transferred by eye or drawn or traced onto the copper surface, the lines were etched into the surface with some engraved lines, such as the legend. The areas of shadow, tone and texture were done using aquatint. Once the copper plate was ready for proofing, it was passed to the printer who inked it up, wiped it and pulled a proof. The resulting state or proof would have been inspected by Havell and corrected if necessary. Once a proof was approved, it went to the colorers. Using the original drawing as the guide, the watercolors were applied. The hand-colored proof was again inspected, and ultimately approved by Havell. It and the original drawing were then sent to Audubon for his authorization to go ahead. Once that had been received, Havell began printing the edition of that Plate.

Throughout the eleven years of the publication of *The Birds of America*, Audubon constantly complained to Havell about the quality of the Plates. Many letters from Audubon detailed mistakes and suggested ways to correct errors. He complained about the engraving of the birds, other design details and the nomenclature (legend material). The following are two examples:

I have examined...all the Plates as they hang on the walls around me, and I am surprised myself to see how carelessly *I have past over faults* which no difference of time in the engraving or colouring could not have greatly improved.—Your letter Engraver must be dismissed or become considerably more careful and in fact must now correct his

²⁶ Audubon, *1826 Journal*, 248. Entry dated 1 November 1826.

²⁷ *Ibid.*, 263. Entry dated 27 November 1826.

²⁸ Charlotte Hilton Green, "John James Audubon—America's Great Bird Man," *A Selection from the Birds of America by John James Audubon* (Raleigh: North Carolina Museum of Art, 1976), v.

past errors. —When I return to London *you & I* must have a regular and compleat overhauling of the Coppers.²⁹

[Victor,] Should you think that Havell does not pay to you all the regard, attention & respect due from his situation towards his Employer, let me know of it at once and I shall settle with him and procure someone else. —do not suffer the least trifle in the finishing of the Copper plates to escape—The Bills & feet are of late certainly not so good as in the latter part of the 1st Volume....The Work must Improve and not fall off in the Engraving when the Original Drawings are becoming better and more beautiful the more we make of them.—who engraves at present next to Havell—is it Mr Blake? I liked him much and if he is still in the Employ of Havell, I would advise you to make him some small present now & then and tell him of the alteration you wish to have done.³⁰

With regard to the coloring of the Plates, Audubon seems to have made many more complaints, especially when Havell Sr. was in charge. One letter from Audubon to Havell Jr. stated, “I could have had many new names [subscribers] at Manchester, had not the people there seen different setts in different houses almost of different colours for the same plate.”³¹ An example of another suggestion he made to deal with a mistake in coloring in the proof of Plate 281, “Great White Heron,” is,

the Bird is perfect! The termination of the darker portions of the sky are too harsh, and I should like you to have these extremities or *outer edges* SCRAPED and the purplish tint about those parts rendered darker by the *Colourers*. If you can *subdue* the little figures of the Heron in the distance somewhat, it will improve the plate.—but take it “all in all” it is most excellent, and I feel highly gratified that you have met my utmost wishes in it.³²

Almost without fail, once Audubon vented his anger toward Havell, he ended his letters with words of encouragement. He did not want to upset Havell too much for fear that he would lose his services. In letters to Victor, however, especially in early 1834, there were thoughts of dismissing Havell. Audubon wrote to Victor that, if Havell could not do the work to suit “our own Views of it, another person will be found who will do it no doubt, and very willingly too.”³³ Whatever this major disagreement between the Audubons and Havell was, it was evidently cleared up because Havell was not dismissed.

The rate of production increased dramatically in 1834, halfway through the eleven-year venture. One reason for the increase in production was the nature of the drawings that comprise Volume 3. Volumes 1 and 2 are drawings of land birds, rich with other animals, as well as details of plants and nests. They are composed of complex designs and color patterns. Volume 3, on the other hand, is made up entirely of water birds, many of which are seen against

²⁹ Audubon, *Letters*, 1:112. Letter to Havell, dated 29 June 1830.

³⁰ *Ibid.*, 1:208–209. Letter to Victor, dated 15 April 1833.

³¹ *Ibid.*, 1:107. Letter to Havell, dated 7 June 1830.

³² *Ibid.*, 2:107. Letter to Havell, dated 12 December 1835.

³³ *Ibid.*, 2:13. Letter to Victor, dated 12 March 1834.

the sky or water. Otherwise, simple shore plants and rock formations complete the backgrounds. Audubon wrote Havell repeatedly that the “Water Birds will not be more difficult or troublesome than the Land Birds.”³⁴ He also wrote,

Can we not rush the work still faster?—Can *you* not publish the 2d [sic] Volume, (all Water Birds, and in my opinion easier than those of the Land) at the rate of 10 Numbers per annum?—It would be a great satisfaction to me, as I conceive myself growing old very fast.³⁵

Accordingly, production picked up in 1834 to fifty Plates (2,500 prints) per annum as compared to the twenty-five Plates completed each in the years 1827 through 1831 and thirty Plates each in 1832 and 1833.

As stated before, Audubon had originally intended *The Birds of America* to comprise 400 plates, but it became obvious to him in 1837 that there were many American species of birds being newly discovered by other ornithologists. He tried to acquire skins of these birds through a friend, Edward Harris in Moorestown, N.J. In February 1838, Audubon wrote to Harris in desperation:

[for the want of specimens] my Publication is almost at a stand, for as I am forced to finish my Work in as few numbers of Plates as possible (not to Lose any more subscribers in this country) I am forced to introduce as many new species of the same Genera in the same plate.³⁶

However, Audubon had to exceed his initial limit of 400 Plates, and some subscribers did withdraw. In spite of this, Audubon felt more responsible toward the world of natural history, and several times, he included several species in one Plate. These composite Plates are found in the last half of Volume 4.

When the last print was pulled on 20 June 1838, a total of 87 Numbers—435 Plates—were issued in four volumes. There are 1065 individual birds depicted. Approximately 87,000 Plates were printed and colored. Audubon noted that the cost of the entire publication was £28,910-13-7 or \$115,640, “not calculating any of my expense, or that of my family for upwards 14 years.”³⁷

Audubon, however, did not stop his exploration of natural history with the completion of *The Birds of America*. In 1839, he went on to complete the text volumes that accompanied the double-elephant folio volumes, titled *Ornithological Biography*, begun in 1831. These five, quarto volumes were given to every subscriber of the folio set. In that year, he also published A

³⁴ Ibid., 2:246. Letter to Victor, dated 9 September 1833.

³⁵ Ibid., 1:267. Letter to Havell, dated 24 November 1833.

³⁶ Ibid., 2:196. Letter to Harris, dated 6 February 1838.

³⁷ Fries, *Double Elephant Folio*, 114.

Synopsis of the Birds of America that is an index to *The Birds of America* and the *Ornithological Biography*.

In 1839, Audubon began another large publication project—the lithographic version of *The Birds of America*. The camera-lucida was used to exactly reproduce the double-elephant folio version, although some changes in habitat were made by the printer, J. T. Bowen of Philadelphia. This work is known as *The Birds of America*, octavo or miniature version. The first five volumes were imprinted with Audubon's and J. B. Chevalier's names as publishers, while volumes six and seven had Audubon's imprint alone. In the octavo version, there are an additional sixty-five plates, making a total of 500 plates. These included additional drawings done by Audubon and his son, John Woodhouse. The seven-volume lithograph edition was issued by subscription from 1840 through 1844.

Audubon's last, great project was the publication of *The Viviparous Quadrupeds of North America*. This consisted of 150 plates that were lithographed and hand-colored from drawings by Audubon and his son, John, issued between 1845 and 1848.

After the publication of *The Birds of America*, Audubon returned to America in the autumn of 1839. In 1842, he and his family moved to Minnie's Land, the family's estate near New York city. Robert Havell Jr. and his family emigrated to America in 1839. He became a well-known engraver and a minor Hudson River School painter.

In 1846, Audubon's sight had failed to the extent that his work on the *Quadrupeds* had to be given over to his sons. On 27 January 1851, Jean James Audubon died, leaving behind him the greatest work of art based on a scientific study, *The Birds of America*.

CHAPTER II

THE SYRACUSE UNIVERSITY SET OF *BIRDS OF AMERICA*

Dating the set

In order to date the Syracuse University's four-volume folio set of *The Birds of America*, three things were taken into consideration: the dates found on each sheet associated with the countermark (watermark), the information found on the legends of each Plate, as well as a few variations in the details in some of the images.

The watermark or countermark is made when the paper is transformed from pulp into a cohesive sheet. The marks are images, devices or names formed in wire and sewn onto the woven wire cloth covering the papermaking mould. When the paper was formed on the mould, the pulp lay evenly thick on the surface except over the raised wires; there is less pulp in these areas. In transmitted light, the countermark or watermark is seen as a less dense, lighter line against the denser, darker sheet. Strictly speaking, watermarks are images or figurative designs such as Bull's Head, Fool's Cap, Pro Patria, etc. Dates and initials of the papermaker may sometimes be found in watermarks. A countermark, as opposed to a watermark, comprises just the name or initials of the papermaker or mill, and sometimes, a date. Countermarks and watermarks are usually found on opposite halves of a sheet of paper; the latter usually in the left half. Prior to 1700, such marks were usually only watermarks. Later on, both were used, but now, it is more common to find just the countermark. The countermarks found on the sheets of *The Birds of America* are J WHATMAN | TURKEY MILL | date (centered on 3 lines) and J WHATMAN | date (centered on 2 lines).

Prior to 1794, countermarks cannot be relied upon to date the manufacture of English paper because mill owners were not concerned about making a new wire mark every new year. (The date on the mould was more likely to indicate when it was made or recovered.) Occasionally the same date remained on the mould for a number of years. Peter Bowers noted that in 1794, parliament passed a law requiring mill owners to include the year the paper was made, if it was to be used for printing. By 1811, when the act was repealed, most English mills, including the Whatman mills, were more likely to change "the dates on their moulds quite regularly."³⁸

In Appendix A, there is a list of countermarks found on each of the 435 Plates found in the Syracuse set. In some cases, the date could not be identified because either it was too far into the gutter of the volume; or it had been trimmed off; or the media lay too thickly upon the surface of the paper and transmitted light could not be used effectively. Volume 1 is made up

³⁸ Peter Bower, "Reading the Paper: Context and Interpretation in the Analysis of Paper," *Hand Papermaking* 20, no. 2 (Winter 2005): 29.

almost entirely of countermarks dated 1832. (This conclusion is based on those dates that can be identified.) The only known exceptions are Plate 85 “Yellow Throated Warbler,” dated 1831 and Plate 100 “Marsh Wren,” dated 1833. There seems little doubt that Syracuse’s Volume 1 was printed in late 1832 or early 1833. Compared to the schedule that Havell followed, it can be seen that the printing of the Syracuse set Volume 1, Plates 1–100, does not coincide with it:

Plates	Havell’s schedule	Syracuse countermark dates
1–25	1827	1832
26–50	1828	1832
51–75	1829	1832
76–100	1830	1831, 1832, 1833

When initial arrangements were made with Havell Sr., a total of one hundred prints of each Plate were to be done at the same time. It is also known that as Audubon acquired more subscribers, new impressions had to be made from the earlier plates. It seems likely, therefore, that extra Plates of Volume 1 were printed up in 1832 and stockpiled for later use.

Volume 2 contains a variety of dates. The first thirty Plates range in dates from 1830 to 1833. For example, Plate 101 is dated 1831; Plate 102, 1832; and Plate 103, 1830. The rest of the Volume is dated more consistently, and the publication of the Syracuse set now closely followed Havell’s printing schedule.

Plates	Havell’s schedule	Syracuse dates
101–125	1831	1830, 1831, 1832
126–155	1832	1831, 1832, 1833
156–185	1833	1832, 1833
186–200	1834	1833, 1834

Volume 3 (Plates 201–300) also closely follows the publication schedule as does Volume 4 (Plates 301–435):

Plates	Havell’s schedule	Syracuse dates
201–235	1834	1834
236–285	1835	1834, 1835, 1836
286–300	1836	1836
301–350	1836	1836
351–400	1837	1836, 1837
410–435	1838 ³⁹	1837, 1838

It seems that Havell was printing more copies of the Plates in Volumes 2, 3 and 4 than there were subscriptions at the time. Audubon and he realized that it was easier to print a larger edition at one time than it was to go back after a few years to produce more of the earlier Plates.

³⁹ Francis H. Herrick, *Audubon the Naturalist: A History of His Life and Time*, 2d ed. (New York and London: A. Appleton–Century Co., 1938), 402.

It is known that Havell brought fifteen extra sets with him to America in 1839 that were not intended for subscribers but would be offered for sale.⁴⁰ Before the provenance was discovered and based on this information, the Syracuse set was thought to have been either subscribed to sometime between 1832 and 1838, or it was one of the fifteen extra sets sold later.

Other clues that point to printing dates are the credit lines in the legends on the Plates in Volume 1 and 2. (See Appendix B for a complete list of the legend information found on Plates 1–15 of the Syracuse University set.) In the Syracuse set, Volume 1, there are only two instances where dates are found in the credit lines after Havell’s name. These are Plates 2 and 7 with “1829” included after “R. Havell Jun^r.” It is also possible that “1829” also appears on Plates 1 and 6. However, these Plates have both been trimmed so that either the end or the bottom of the line is missing. As Havell dated some of the first Plates “1829,” they must have been printed in or after that year.

In a small publication by Emory F. Hanaburgh, he lists the following information, which is based on an examination of twelve complete sets and some individual Plates of “first issues” of *The Birds of America* (Cm = countermark date; L = legend date):

Plates	Dates: Cm/L	Engraver(s)
1–6	Cm 1827/L 1827	W. H. Lizars (WHL)
7–10	Cm 1827	WHL & Havell Sr.
11–30	Cm 1827	Havell Jr. & Sr., or Havell & Son
31–35	Cm 1827/L 1828	Havell Jr. & Sr., or Havell & Son
36–50	Cm 1828/L 1828	Havell Jr. & Sr., or Havell & Son
51–65	Cm 1828/L 1829	Havell Jr. & Sr., or Havell & Son
66–75	Cm 1829/L 1829	Havell Jr. & Sr., or Havell & Son
76–80	Cm 1829/L 1830	Havell Jr.
81–100	Cm 1830/L 1830	Havell Jr.
101–105	Cm 1830	Havell Jr.
106–108	Cm 1830 & 1831/L 1831	Havell Jr.
109	Cm 1830/L 1831	Havell [Jr.]
110	Cm 1830/L 1831	Havell Jr.
111–115	Cm 1831/L 1831	Havell [Jr.]
116–130	Cm 1831	Havell [Jr.]
131–155	Cm 1831 & 1832/L 1832	Havell [Jr.]
156–185	Cm 1833/L 1833	Havell [Jr.]
186–235	Cm 1834/L 1834	Havell [Jr.]
236–285	Cm 1834, 1835 & 1836 /L 1835	Havell [Jr.]
286–350	Cm 1836/L 1836	Havell [Jr.]
351–400	Cm 1837/L 1837	Havell [Jr.]
401–435	Cm 1837 & 1838/L 1838	Havell [Jr.] ⁴¹

⁴⁰ Fries, *Double Elephant Folio*, 115–116.

⁴¹ Emory F. Hanaburgh, *Audubon’s ‘Birds of America’: A Check List of First Issues of the Plates in the First Folio Edition 1828–1838* (Buchanan, N.Y.: E. H. Hanaburgh, 1941), 4–16.

Fries published a more complete list of the many variations for Plates 1–11 :

Plates	Names on credit lines	Countermark dates found
1	W. H. Lizars (WHL) WHL Havell Jr. 1829 WHL Havell Jr.	1826–1827 1830 1832–1838
2	WHL WHL Havell Jr. 1829	1826–1827 1830–1836
3	WHL Havell Jr.	1825–1830 1831–1838
4	WHL Havell Jr.	1826–1828 1830–1837
5	WHL Havell Jr.	1825–1830 1830–1838
6	WHL WHL Havell Jr. 1829 Havell Sr. WHL Havell Jr.	1827 1828 1832–1837
7	WHL Havell Sr. WHL Havell Jr. 1829 Havell Sr. WHL Havell Jr.	1826–1827 1828–1830 1830–1836
8	WHL Havell Sr. WHL	1826–1830 1831–1837
9	WHL Havell Sr. WHL	1827–1830 1831–1834
10	WHL Havell Sr. Havell	1827–1830 1831–1837
11	Havell Jr. Havell Sr. Havell	1827 1833 ⁴²

It is interesting to note that after 1830, Havell Sr.'s name does not appear on any of the Plates examined by Hanaburgh or Fries. Since the Syracuse set was printed during or after 1832, it is not surprising that his name does not appear on any of those Plates either. It seems that Havell Jr. removed references to his father's work on *The Birds of America* in late 1830. It is possible that the old feud between father and son reappeared in that year or that Havell Sr. became physically incapable of attending to the publication, and Havell Jr. decided to take full credit for the work.

However, on most of the Plates that Lizars originally engraved, Plates 1–10, Havell did

⁴² Fries, *Double Elephant Folio*, 215–224, 421.

retain Lizars's name. In the Syracuse set, the exceptions are Plates 3, 4, 5, 9 and 10 where only Havell's name appears. Havell Sr.'s name never appeared on those Plates. Did Havell Jr. retouch these five Plates enough to warrant removing Lizars's name? Or were these Plates completely new engravings by Havell? It is known that Audubon, as a kind of test during initial negotiations, asked Havell Jr. to do a new engraving of Plate 3 to compare his work with Lizars's. When Audubon saw this new version, he exclaimed, "Ze jig is up, ze jig is up!"⁴³ Apparently, Havell took this as disapproval, but Audubon quickly reassured him that his work was excellent. Another question is: Did Havell use Lizars's original Plate 3 until 1830 and then etch his own version? And if so, did he also make new versions of Plates 4, 5, 9 and 10? The only sure way to begin to answer any of these questions is to compare both versions of each Plate. Unfortunately, this was not possible within the scope of this thesis, and because of the varied location of sets, the task will be difficult unless photography was used.

According to Hanaburgh, Havell also stopped using "Jun" after his name in 1831, starting with Plate 109, 111 and on. In the Syracuse set, however, only the following Plates have "Jun" after Havell's name: 1-7, 108 and 110. For some reason, Havell elected to leave "Jun" on the first seven Plates, as examples have been found on paper dated 1838. When the Plates without it are examined, it is not clear whether just the "Jun" was removed, or whether the whole credit line, "Engraved, printed & coloured by R. Havell Jun" was scraped and burnished from the copper plate and re-engraved.

It is possible that Havell let the Syracuse Plate 108 (Cm 1833) slip through without the "Jun" being removed. Syracuse Plate 110 (Cm 1831) was probably printed before the "Jun" was removed from the copper plate.

There are also differences in the initials immediately following Audubon's name in the credit lines. In the Syracuse set with only one exception, these are Fellow of the Royal Society of London, "F,R,S." and Fellow of the Linnaean Society of Edinburgh, "F,L,S." In Plate 2, "F.R.S.E." follows his name; these stand for Fellow of the Royal Society of Edinburgh. According to Fries, there are four variations of Plate 2, and only the last one retains the F.R.S.E. initials. For some reason, Plate 2 was never changed to be uniform with all the others.

Audubon complained many times to Havell about inaccuracies in nomenclature and lettering. In a long letter to Havell dated 2 March 1831, Audubon pointed out standards for the format of the numerals and letters, sizes of letters, locations of numerals and legends, etc., and he cited earlier, published Plates to be used as examples. These standards include the credit lines for the artist and the engraver: "Drawn from nature by J. J. Audubon. F,R,S. F,L,S." and

⁴³ Ibid., 25-26.

“Engraved, printed and coloured by R. Havell Jun^r.”⁴⁴ It can be expected, therefore, that Plates done after 1831 conformed to Audubon’s recommendations, although it is clear that Havell differed with Audubon about the inclusion of the “Jun^r.” It is also clear that earlier copper plates were re-engraved and reissued as per Audubon’s wishes. Because most of the American subscribers signed up after Audubon’s second return visit to America in 1831, it is likely that most American sets have this standardized lettering.⁴⁵

Another interesting variation is found on Plate 6 “Wild Turkey.” It is the depiction of a snail being hotly pursued by chicks in the lower right corner. In the earliest version engraved by Lizars, there was no snail. In a slightly later version engraved by Lizars, retouched by Havell Jr., and colored by Havell Sr., the snail is there, but it is difficult to see it against the green background. In the last version engraved by Lizars and retouched by Havell Jr., included in the Syracuse Plate (Cm 1832), the snail was colored brown. Fries lists the earliest date, based on the countermark for this last version, as 1832.⁴⁶

On 28 August 1838, Audubon asked Havell to print thirteen new Plates that were composites of birds taken from previously published Plates. Havell printed a known six sets containing all or some of these composite Plates.⁴⁷ The Syracuse set is not one of these. It is probable, then, that the Syracuse set was already bound before the end of 1838.

Provenance

Syracuse University came into possession of *The Birds of America* in the fall of 1896 through a gift from the Hon. James J. Belden.⁴⁸ Belden was a trustee of the University, a New York state congressman and mayor of Syracuse. He was born in 1825 in Fabius, Onondaga County. He followed a career in the mercantile business and, in 1850, emigrated to California. After three years, he returned to Syracuse and married the daughter of wealthy contractor, Robert Gere. Belden became a contractor and was involved in building street railroads in Detroit and the Weiland Canal in Canada, among others. His most important work was done on the West Shore railroad between Syracuse and Little Falls. Belden became a trustee of the University upon its founding in 1870. In 1877 and 1878, he was mayor of Syracuse, and in 1881, he established the Robert Gere Bank. He became a congressman in 1887 and was reelected several times.⁴⁹ He donated the political economy library to the University in 1895. Belden died in 1904.

⁴⁴ *Ibid.*, 213. The letter is in the Princeton University Library.

⁴⁵ *Ibid.*, 214.

⁴⁶ *Ibid.*, 220.

⁴⁷ *Ibid.*, 307–309.

⁴⁸ “Birds of America,” *The University Forum* 2 (November 1896): 114.

⁴⁹ Emily DuBois Benedict, “Special Collections in the Syracuse University Library III. The Audubon ‘Birds of America’,” *Syracuse University Alumni News* 15 (February 1934): 3, 26.

Because Fries did not know where or from whom Belden acquired the folios when he wrote his book, he offered the suggestion that there might have been some connection between the set presented to the University and one seen at the residence of the Hon. Nathan Fitch Graves on or about 2 April 1877 by a group of students who examined “the magnificent illustrations in Audubon’s *Birds of America*.”⁵⁰ Fries speculated that there may have been a connection between Nathan Graves (1813–1896), and James Graves of Syracuse, who appears in Anthony Woodward’s list of owners of *The Birds of America* issued in 1901.⁵¹ It is possible that James Graves was a relative of Nathan Graves, and that, when Nathan died in 1896, the set passed to James. The whereabouts of this set is not known.

Benedict, in her article on the University’s *Birds of America*, stated, “The name of a former owner is written on the flyleaves with the address ‘Natchez, Mississippi’ ... The Syracuse STANDARD states that he [Belden] bought it through Brentano’s at a cost of \$1,800.”⁵² Following these clues, the flyleaves of the folio volumes were rechecked, but no inscriptions were found. The only information found in the four volumes were typed, library bookplates giving Belden’s name, and the accession numbers written in pencil. On the chance that Syracuse’s five-volume set of the *Ornithological Biography* was part of Belden’s gift, those volumes were checked. In addition to the same typed, library bookplates found in the folios, older, handwritten bookplates were found on the inside front pastedowns. The following inscriptions written in iron gall ink and pen were found on the second endpapers:

Volumes 1–4
Haller Nutt
[hand-drawn rule]
Natchez

Volume 5
Haller Nutt
[hand-drawn rule]
Longwood
Natchez Miss

Written in pencil on the verso of the first endpaper of Volume 1 is: “ha is. xx 9 vols.” The five volumes of the *Ornithological Biography* and the four folio volumes of *The Birds of America* make a total of nine. This inscription may have been written by the bookseller. It is clear that the five text volumes were in the possession of Haller Nutt of “Longwood,” Natchez, Mississippi. It is also possible that these inscriptions do not appear in the folio volumes because the pastedowns and endpapers were replaced after they came into the possession of Syracuse University (see Appendix E). Fries’s subscription lists, as well as Woodward’s, were searched for any mention of Haller Nutt or Natchez, but none was found. However, Haller Nutt’s does appear elsewhere in Fries’ book:

⁵⁰ Fries, *Double Elephant Folio*, 311.

⁵¹ *Ibid.*, 419.

⁵² *Ibid.*, 26.

In May 1853 Victor [Audubon], while in the South on a canvassing trip for subscribers to the *Quadrupeds*, wrote from Vicksburg to John Bachman, "I have obtained in all at Mobile, New Orleans, Natchez & this place 300 subscribers, and have sold one Copy of the Large Birds and 7 copies of the small birds which will have to be printed and coloured so I have done pretty well on the whole." The purchaser of this set remains unknown.

In the *New York Sun* for 17 February 1896 there appeared an article about a bookdealer, name not given, of 115 Nassau Street, who had for sale an Audubon folio with five volumes of the *Ornithological Biography*. On the flyleaf of one of the volumes appeared the name of Haller Nutt of Natchez. It is known that Dr. Haller Nutt, a wealthy planter of Natchez, possessed an outstanding library. After his death the library came into the possession of his son, Prentiss Nutt [sic] [sic], who became a resident of Washington, D. C. It may have been Dr. Haller Nutt of Natchez who in May 1853 purchased the folio from Victor.⁵³

Dr. Haller Nutt was, as Fries describes, a prominent citizen of Natchez. He is best remembered in connection with his house, "Longwood" or "Nutt's Folly," which was designed by Philadelphia architect, Samuel Sloan. This important, octagonal house was started just before the Civil War, but because of chronic financial and supply problems, the interior was never completed.

Dr. Nutt bought the Longwood estate in 1850.⁵⁴ Therefore, as the inscription in Volume 5 of the *Biography* mentions "Longwood," it can be assumed that he purchased *The Birds of America* and *Ornithological Biography* after 1850. Fries' conclusion that Nutt may have bought them from Victor in May 1853 certainly seems likely. Nutt died in 1864, and the family was in financial trouble for the next thirty years. In the early 1890s, Julia Nutt, Haller's widow, "must have seen some prosperity" because she asked for estimates to complete "Longwood."⁵⁵ Could it be that the Nutt family began to sell the library and other possessions in the 1890s? Fries mentioned that the library went to Sargent Prentiss Knut (he had changed his name to the original spelling), but it is not clear whether *The Birds of America* were in his possession in Washington or in Natchez. In any case, it appears that the volumes were for sale in 1896.

Taking another clue from Benedict's article that Belden "bought it through Brentano's," lists of New York city booksellers were searched for the address of Brentano's in the late nineteenth century. In listings dating from 1888, 1900 and 1919, Brentano's addresses are given as 5 Union Square, 31 Union Square and 5th Avenue, respectively. The search for a bookseller at 115 Nassau Street yielded no results.⁵⁶ Either the *Syracuse Standard's* information was incorrect,

⁵³ Ibid., 123–124.

⁵⁴ William L. Whitwell, *The Heritage of Longwood* (Jackson: University Press of Mississippi, 1975), 22–23.

⁵⁵ Ibid., 78.

⁵⁶ John Tebbel, *A History of Book Publishing in the United States. Volume 1. The Creation of an Industry, 1630–1865* (New York, R. R. Bowker Co., 1972), 2:712–730 passim.

or Brentano's may have purchased *The Birds of America* from the Nassau Street bookseller and then sold it to Belden. These details do not, however, detract from the conclusion that Dr. Haller Nutt probably bought *The Birds of America* from Victor Audubon, and that that copy was purchased by James Belden who in turn presented it to the University.

In the first chapter of this thesis, mention is made of the sale of the last full-bound set of *The Birds of America* for \$1100 in 1840. This would seem to contradict the sale of this set to Haller Nutt in 1853. However, the key words are "full bound." Full bound means that the volumes were completely bound in leather. The Nutt-Syracuse University set is half bound in leather with marbled paper sides.

To trace the ownership of the Syracuse set of *The Birds of America*, then, would include the following steps. Volume 1 was printed as a set of extra copies in 1832 after the first hundred sets had been printed over the previous five years. Volumes 2, 3 and 4 were also printed as extra sets at the same time as the other Plates intended for subscribers were printed. The 435 Plates were then half bound in four volumes, probably in mid-1838. Havell brought the bound set with him to America in 1839. In May 1853, Victor Audubon, on a visit to Natchez, sold this set to Dr. Haller Nutt. The set was then offered for sale through Brentano's, a New York city bookseller, in February 1896. It was purchased by James Belden and donated to Syracuse University in the fall of 1896. It has been in the possession of the University since that time.

CHAPTER III

TECHNICAL EXAMINATION OF THE SYRACUSE UNIVERSITY SET

Paper: historical background and technical analyses

The paper that was used exclusively in the printing of *The Birds of America* is countermarked either J WHATMAN | TURKEY MILL or J WHATMAN. Because “J Whatman” is found in both countermarks, many people think the papers were made by the renowned English papermaker, James Whatman.

This is, however, not the case. Turkey Mill at Maidstone, Kent, England, was started in 1680. Originally, it was a textile mill and called Turkey Mill because of Turkish red (madder) fulling cloth for which it was famous. In 1740, James Whatman I married the widow of Richard Harris who had been the owner of Turkey Mill. By marriage, it became the property of Whatman, and he turned it into a paper mill.⁵⁷ Soon thereafter, Whatman traveled to Europe and visited the most celebrated paper mills. He brought home with him the knowledge to make better paper than had been made previously in England.⁵⁸ Turkey Mill specialized in drawing, writing and copperplate papers, and by 1760, the reputation of the quality of Whatman papers had spread throughout England, Europe and America. Whatman I is also variously credited with the manufacture of the first western “wove” paper around 1750. The English printer John Baskerville appears to have asked Whatman to make a paper with a smooth surface that would accept the letterpress impression more evenly and print the hairlines of his new typeface.⁵⁹

Papers made in the West prior to this were laid and chain. The coverings for the papermaking moulds for laid papers consist of wires, closely spaced together, running horizontally across the mould. These laid lines or wires are then attached to one another with two interweaving, thinner wires: chain lines. Under the cover are a series of vertical, supporting wooden ribs spaced approximately one inch apart, and once woven, the cover is sewn to the ribs. These so-called laid and chain papers have a slightly undulating surface conforming to the pattern made in the paper by the distinct cover. This pattern is formed in much the same way that countermarks and watermarks are.

Baskerville reportedly disliked this irregular surface and asked Whatman to make a smooth-surfaced paper. This “wove” (also called “vellum” or “velin”) surface is produced by replacing the laid and chain wire cover on the mould with a fine, woven “cloth” made of wire. All of the paper used for *The Birds of America* is wove.

⁵⁷ Alfred H. Shorter, *Paper Mills and Paper Makers in England 1495–1800* (Hilversum, Holland: The Paper Publications Society, 1957), 187.

⁵⁸ Joel Munsell, *Chronology of the Origin and Progress of Paper and Paper-making*, 5th ed. (Albany, N.Y.: J. Munsell, 1876), 40.

⁵⁹ Hunter, *Papermaking*, 125–127.

In 1794, Whatman's son, James II sold the four mills he owned to three partners: Thomas and Finch Hollingworth, and William Balston. These mills were: Turkey Mill, Poll Mill, Loose Mill, all near Maidstone, Kent; and Hollingbourne Mill, nearby in Leeds (Kent). Balston had been in Whatman's employ for a number of years, and therefore was very familiar with mill operations and quality control. This partnership between the Hollingworth brothers and Balston lasted until 1805. The partnership was then dissolved, and the Hollingworths assumed ownership of Turkey Mill, Poll Mill, and Loose Mill, while Balston took the Hollingbourne Mill. However, Balston had ambitious plans to build a new, large mill at Maidstone.⁶⁰ It was to be called Springfield Mill because the site had abundant, pure spring water, essential for making quality paper. It was to have ten vats for making the "best paper, writing and drawing."⁶¹

With the original sale of the mill properties from Whatman to the Hollingworths and Balston went the rights to the countermarks: J WHATMAN | TURKEY MILL and J WHATMAN. When the partnership dissolved, the Hollingworths retained the exclusive use of the countermark J WHATMAN | TURKEY MILL, while Balston owned the J WHATMAN countermark.⁶² By the 1810s, both firms were commonly making paper in double-elephant size (26.75 x 40 inches).⁶³

By 1830, Turkey Mill had nine vats for hand papermaking, and "The quality has always been of the best, and the original Turkey Mill watermark is a guarantee for all that is good in paper."⁶⁴ In 1846, Turkey Mill began machine-made paper production, and by 1848, hand papermaking was abandoned by the mill.

For fifty years, the Hollingworths and Balston firms were rivals for the quality plate printing and drawing paper trade in England. That their papers were well known is established by the fact that Audubon made almost all of his drawings (and all of the engravings) for *The Birds of America* on English Whatman paper.⁶⁵

In the 1850s, Springfield Mill had ten vats and was renowned for its production of handmade papers especially in the large sizes, antiquarian and double elephant. In a letter dated 10 July 1840 from Mr Gaussen (a partner in the Balston firm) to Balston, he warned that the price of rags was going up and that they were facing stiff competition while Hollingworths, apparently their chief rivals, could afford to sell at lower prices, "but I doubt if they can turn out

⁶⁰ Thomas Balston, *James Whatman. Father & Son* (London: Methuen, 1957), 139.

⁶¹ Alfred H. Shorter, *Papermaking in the British Isles: An Historical and Geographical Study* (New York: Barnes & Noble, 1972), 104.

⁶² Balston, *James Whatman*, 139.

⁶³ Balston, *William Balston*, 158.

⁶⁴ A. Dykes Spicer, *The Paper Trade. A Descriptive and Historical Survey of the Paper Trade from the Commencement of the Nineteenth Century* (London: Methuen & Co., 1907), 177.

⁶⁵ New-York Historical Society, *Original Watercolor Paintings*, xxxi.

a large quantity so clean and sound; there, I hope, we may have an advantage.”⁶⁶

Finally, on 1 March 1859, the two firms signed an agreement that limited the use of the countermarks J WHATMAN and J WHATMAN | TURKEY MILL to handmade papers. In return for a large monetary payment, Hollingworths agreed not to use either of the countermarks (although they claimed they had a right to use both) and not to make any handmade paper at any of their mills.⁶⁷

When considering the quality of the two papers found in *The Birds of America*, Hanaburgh noted that

The “Turkey Mill” paper was of lighter weight than the “J. Whatman,” generally took on a slight drab tinge in the course of time, and the colors painted thereon softened in tone. The paper having the “J. Whatman” watermark only was heavy, maintained its sparkling white, if kept under proper conditions, and held the colors as brilliant as on the day they were applied. To the collector it is a question of choice whether he prefers time softened coloring or outstanding brilliance.

The “Turkey Mill” paper was almost exclusively used [by Havell] until 1830, though experiments with the “J. Whatman” were carried on as early as plate number IV. From the beginning of 1830 to the end of 1833 the “J. Whatman” paper predominated, in 1834 the “Turkey Mill”, and from 1835 to 1838 the “J. Whatman” was generally used, with the “Turkey Mill” supplying shortages.⁶⁸

These are very interesting comments. It is not clear from them, however, whether Hanaburgh was aware that the papers came from two different mills, but his comments about the differences in thickness and colors of the papers are certainly true. However, his observation that Havell used “J. Whatman” paper predominately from 1830 to 1833, does not hold true for the Syracuse set. As seen in the list of countermarks in Appendix A, Volume 1 consists of J WHATMAN | TURKEY MILL (Cm 1832) with only six exceptions. By the time of the publication of Volume 2, the trend that Hanaburgh described begins to hold true for the Syracuse set. In Volume 2, that countermark (Cm 1832, 1833, 1834) is used only 39 times out of a possible 100. In Volume 3, generally, J WHATMAN | TURKEY MILL (Cm 1834, 1835) was used for the first 50 Plates, while J WHATMAN (Cm 1834, 1835, 1836) was used for the last 50. And in Volume 4, J WHATMAN (Cm 1836, 1837, 1838) was used for all 135 Plates except for eight—all J WHATMAN | TURKEY MILL (Cm 1837). The title pages for Volumes 1 and 2 are J WHATMAN | TURKEY MILL

⁶⁶ Balston, *William Balston*, 140.

⁶⁷ *Ibid.*, 148.

⁶⁸ Hanaburgh, *Birds of America: Check List*, 3.

(Cm 1838, 18—), while the ones for Volumes 3 and 4 are J WHATMAN (Cm 1836, 1838).

Fries lists early Plates, dating from 1826 to 1836, as having either countermark with no discernible pattern of use.⁶⁹ Their use may simply have been a question of supply and demand. When considering the Syracuse set, it is not until 1835 that J WHATMAN papers predominate.

When the condition survey of the Syracuse set was complete, it was clear that the J WHATMAN | TURKEY MILL papers used in 1832 were superior in quality to those used in 1837. The criteria were: predictable degree of discoloration, flexibility and weight. The J WHATMAN papers, with very few exceptions, were thought to be generally superior to any of the J WHATMAN | TURKEY MILL papers. It would seem that Gausse's evaluation of the "clean and sound" qualities of later Springfield Mill papers compared to the Turkey Mill papers remained true.

The analyses of the paper samples proved interesting but not particularly surprising. Small samples were taken from the binding edge of Volumes 1 and 2 after they were pulled (disbound). Paper samples from Volumes 3 and 4, however, consisted of minute, surface scrapings, and the results from these samples compared to the larger samples, as expected, were not as conclusive, nor could all tests be carried out on them.

The tests carried out on most of the 37 paper samples were designed to determine fiber content, gelatin, alum, rosin and pH.

Fiber content. All the papers tested from all four volumes were composed primarily of flax fibers with a small percentage of cotton. It is assumed that these fibers came from linen and cotton rags. The flax fibers are relatively short and very well beaten. They have cut ends and are well fibrillated. The cotton fibers by comparison are longer and display very little beating. The fiber samples were examined using a polarizing light microscope. They were also stained with the Herzberg and "C" stains. These were iodine-based reagents formulated by the then Institute of Paper Chemistry, now the Institute of Paper Science and Technology in Atlanta, Georgia, for fiber and fiber-processing determination—all the samples were positive for "rag."

Gelatin. Using the Biuret test, which tests for proteins, gelatin was found in every paper where a large enough sample was available.⁷⁰ In samples where only a few fibers could be scraped from the surface (Volumes 3 and 4), the gelatin tests were negative. To check whether this negative result was due to an absence of gelatin in the samples or to the insufficient amount of sample, similar amounts of fibers were scraped from the surfaces of several other larger samples that had tested positive for gelatin, and the tests were repeated. These also gave negative results for gelatin. It is not possible to conclude that the sample size interferes with the

⁶⁹ Fries, *Double Elephant Folio*, 215–224.

⁷⁰ B. L. Browning, *Analysis of Paper*, 2d ed. (New York and Basel: Marcel Dekker, Inc., 1977), 103.

test results, and that there is gelatin in all samples, but in this case, it is a strong probability.

It is also possible to conclude that the gelatin is on the surfaces of the paper, and not in the interior. The Biuret test is based on a color change. The reagents used on paper that does not have any gelatin leave the fibers blue, while fibers with gelatin turn violet. It was quite easy to see under magnification that in most samples, the surfaces turned violet while the interior fibers remained blue. To be sure that the glue from the binding was not causing the positive result, the tip of a fore-edge corner of one of the Plates, found during the condition survey, was tested. The results were exactly the same as those found on the rest of the samples. It can be concluded therefore, that the papers were probably gelatin sized.

The technique of tub, or surface, sizing with gelatin has been carried out for centuries on handmade papers (as well as machine-made paper drawing, writing and plate printing papers made later in the nineteenth century). Surface sizing entailed taking the ends of sheets of dry paper (perhaps just one sheet in the case of double-elephant paper) in each hand (by two workers for large sheets), and dipping them into a vat containing warm, dilute gelatin. Once the surfaces were covered, the paper was lightly pressed to extract the excess gelatin, and then hung to dry. The size solution tends to migrate to the surface upon evaporation and concentrates there. The purpose of gelatin sizing is to reduce water and ink absorbency into the paper by making the surfaces more compact and smooth, and to make the paper stronger when printed damp.

Alum. The reagent used to test for aluminum ions was aluminon solution.⁷¹ In every paper sampled except the very small samples, this test was positive. The common source for aluminum ions in paper is alum, and papermakers alum or hydrated aluminum sulfate is commonly found in the presence of gelatin sizing.

The alum associated with sizing was used for two reasons. First, it is a preservative, and its use was essential when easily-spoiled gelatin was made in large quantities and stored, even for short periods. Secondly, it hardened the gelatin size. That is, when combined with gelatin, gelatin-alum size imparted to the paper more water repellency than gelatin alone in the same concentration. However, it is incorrect to assume that if alum is found in paper then gelatin must also be present. Alum is also found in the presence of alum-rosin sizing, an internal size, see below. Alum was also used to clean the water used for papermaking by acting as a flocculating agent to precipitate debris out of the water.

Unfortunately, alum is acidic. Undoubtedly, its common use in papermaking probably accounts for most of the acidic nature of rag paper leading to a certain amount of degradation and overall discoloration. It should be noted, however, that when alum is used in conjunction

⁷¹ Ibid., 318.

with gelatin, its acidic nature appears to be somewhat neutralized by the pH buffering characteristics of the gelatin.⁷²

Rosin. Rosin was identified by using the Raspail test.⁷³ In only one sample was the presence of rosin considered to be definite. All other samples were negative or inconclusive. This one positive sample was from the front endpaper of Volume 1. The positive result for this endpaper is best explained if it was a later replacement for the original.

Alum-rosin sizing is an internal, rather than an external or surface, size. This size was discovered in 1807 but was not used in Europe until 1835.⁷⁴ The rosin, gathered from trees, is saponified, and added to the paper pulp in the beater before the paper is made into sheets. Only with the addition of alum is the rosin soap precipitated onto the fibers. When the formed sheet is dried by heat, the rosin is melted onto the fibers making the resulting paper more water repellent, as well as internally stronger.

The bad reputation of alum-rosin sizing is based on the pH of the pulp solution in the beater—it is very acidic, pH 3–2. Paper thus sized is acidic at the start and tends to become more acidic on aging.

pH. The pH tests (to determine the acidity of the paper) were carried out on 10 paper samples selected randomly from those taken from Volumes 1 and 2; the samples taken from Volumes 3 and 4 were too small to test. The pH values were determined using a flat-tipped glass electrode and a pH meter. The technique involved placing the sample on a piece of resilient rubber, dropping a small amount of deionized water (pH 7.03) on the sample, and positioning the electrode on the wet sample. Readings from the meter were taken after ten minutes.⁷⁵ The results were:

Sample number	Plate	Countermark, date	pH
11	40	JWTM, 1832	3.87
16	63	JWTM, (1832)	3.99
25	100	JWTM, 1833	4.40
30	108	JWTM, 1833	3.84
39	159	JW,1833	3.95
43	182	JW,1833	3.95
44	186	JW, 1834	4.57
5	tp, V. 1	JWTM, 1838	4.34
6	tp, V. 2	JWTM, ?	4.01
26	tp, V. 2	JWTM, ?	4.14

The last two samples were from the same title page (tp) in Volume 2. Those results

⁷² Timothy Barrett, personal communications, 1985; conclusions based on his preliminary studies on the effects of gelatin and gelatin-alum sizing on artificially aged paper.

⁷³ Browning, *Analysis of Paper*, 81.

⁷⁴ *Ibid.*, 335.

⁷⁵ *Ibid.*, 172.

illustrate how different pH values may be obtained from the same paper on samples taken from different sites. The range of pH values for these ten samples is from 3.84 to 4.57, and this is very similar to the range quoted by Carolyn Horton: pH 4–4.3.⁷⁶ All of these values are relatively low (neutral is pH 7) and indicate that the papers are indeed acidic. However, the difference in pH values for the papers do not seem to have much bearing on the degree of aging each exhibits. For example, Plate 108 (pH 3.84) has two small edge tears, and on the verso, there is minor offset staining from the next plate. By comparison, Plate 186 (pH 4.57) has one small edge tear. On the recto, there is a small area of brown, spot staining, and on the verso, there is some heavy offset staining from the next plate. In these examples, the offset staining seems to depend more on the amount of acidic ink oil on the succeeding plate than on how each Plate responds to that ink based on its pH.

External conditions that can greatly impact acidity are air pollution, high humidity levels and high temperatures. Internal sources of acid, such as alum, and other processing chemicals, such as bleaches, also cause paper to become more acid in adverse conditions. My guess would be that alum is the primary cause of low pH values in these papers. Even though the papers are acidic, however, most do not exhibit serious deterioration from this condition. One might expect such acidic papers to be so brittle that they would crumble or break with handling. Acidic papers, originally white, usually discolor to various shades of brown. With the exception of the eight J WHATMAN | TURKEY MILL (Cm 1837) papers in Volume 4, which are a light-brown color, the rest of the papers of having both countermarks range from off-white to a cream color.

It would appear that these papers have not and are not deteriorating at an alarming rate. Even the discolored J WHATMAN | TURKEY MILL (Cm 1837) papers feel reasonably flexible and cannot be described as brittle. It is likely that these handmade papers made from linen and cotton rags have a built-in capacity to combat the effects of acidity, probably aided by the buffering qualities of gelatin sizing, which would have seriously degraded more inferior papers.

Printing techniques and media

The black lines and tonal areas on each of the Plates were done by the intaglio process. Several intaglio techniques were used: engraving and etching were used to create the lines, while the aquatint was used to create tonal and textural effects.

It is interesting to note that there is no discernible plate tone on the prints. This absence

⁷⁶ Carolyn Horton, "Conservation Problems of Audubon's *Birds of America*," in *AIC Preprints*, Boston, Mass., May–June 1977 (Washington, D.C.: American Institute for Conservation, 1977), 73.

of even a slight coating of oil-based printing ink left on the surface of the copper plate implies that it was lye-wiped (using a cloth dampened with a lye solution and wrapped around a block of wood) after the ink had been worked into the incised lines. A perfectly clean plate surface is essential for making a brilliant impression where the black ink lines stand out in sharp contrast to the white paper. It is also essential when using transparent watercolors that the white paper be allowed to shine through the colored washes. Therefore, the paper must be devoid of a thin layer of black ink.

Areas of deep shadow were occasionally used by Audubon and Havell to great effect in adding three-dimensionality to the image. However, this was also a cause of concern for Audubon and Victor. For example, Alice Ford noted that “Audubon served mild notice [to Havell] that the bite of the engraved line resembled lithography too closely.”⁷⁷ In two letters that Audubon wrote to Victor, he stated:

Your observation about Havell’s biting the shadow so very black is quite correct—I never could induce him not to do so—but will try him again.⁷⁸

I am grieved and vexed too at Havell’s ways—I have complained myself to him a hundred times of the horrid Black Biting of the plates which is very injurious to them as plates, for as you suspect not above 200 or 300 impressions can be taken from such plates fit for colouring & delivery—I advise you however to try to keep on good terms with him.⁷⁹

In this last quote, Audubon makes an interesting observation on the longevity of the copper plates. In his first dealings with Havell, he wrote to Lucy that “1500 copies may be struck off before they [the copper plates] will need any repair.”⁸⁰ Intaglio copper plates cannot be expected to yield 1500 impressions, and contrary to Audubon’s complaints, the deeper the etched or engraved line is, the more impressions can be made from the plate.⁸¹ The only problem with over-biting etched lines is the possibility that the acid eats away the bottom part of the lines while leaving the line at the surface narrower, creating a \mathcal{Z} shape. This undermines the lines, and over time, they tend to sink and fill in, perhaps creating the lithograph-like lines, about which Audubon complained.

Two hundred impressions per plate is a much more reasonable estimate, and after such a number, some wear would be apparent. Wear of an intaglio copper plate is caused by two

⁷⁷ Ford, *John James Audubon*, 297. Ford is referring to a letter from Audubon to Robert Havell Jr., dated 13 August 1832. The letter is in the collection of the Houghton Library, Harvard University.

⁷⁸ Audubon, *Letters*, 2:13. Letter to Victor, dated 9 March 1834.

⁷⁹ *Ibid.*, 2:13. Letter to Victor, dated 12 March 1834.

⁸⁰ *Ibid.*, 1:30. Letter to Lucy Audubon, dated 6 August 1827.

⁸¹ Anthony Gross, *Etching, Engraving, & Intaglio Printing* (London: Oxford University Press, 1970), 159–160.

things. First, the pressure of successive printings tends to push the edges of the lines together. Much more significant, however, is the repeated, vigorous wiping with rags when removing ink from the surface of the plate.⁸² This wears down the surface making the lines more shallow, so that they hold less and less ink. Lines and tonal areas from these worn plates are weak and gray in tone. Once excessive wear is apparent, the plate may have to be re-etched or re-engraved. Not practiced when *The Birds of America* were produced, copper plates to be used for very large editions were later steel-faced through electroplating. This process allows editions of up to several thousand impressions to be made from etched or engraved plates.⁸³ If Fries's estimates are correct regarding the total number of impressions made from the copper plates, between 175 and 200 complete sets were produced, not counting loose Plates, early states, proofs, and spoiled sheets. Therefore, Audubon need not have worried about a significant deterioration of the copper plates.⁸⁴

The ink used in the printing of the Plates was oil-based, and a carbon black was used as the pigment, either bone black or ivory black.⁸⁵ For three Plates, blue ink was used, and these are Plate 240, "Roseate Tern"; Plate 250, "Arctic Tern"; and Plate 319, "Lesser Tern." The legends for these Plates are also printed in blue. These birds are depicted flying against a blue or blue-green sky, and the blue ink enhances the cool color scheme of the Plates.

Watercolors

At the beginning of the project, Havell Sr. was in charge of the printing and coloring. As mentioned in Chapter I, most of Audubon's comments about the quality of the coloring occurred in the period when Havell Sr. was in charge. After the elder Havell's death in 1832, comments in letters to his son are more concerned with the quality of the printed images and the nomenclature. Once a colored version of the proof for a Plate was finished, it and the original drawing were sent to Audubon for final approval. Once corrections were made, Audubon kept the drawing, and the print was returned to Havell so that the edition of that Plate could commence.

The colors used on the Plates are watercolors—pigments bound in a gum medium. This medium was traditionally gum arabic or gum tragacanth. From the late 1700s, dry watercolor cakes were available commercially but were difficult to wet. Moist watercolors were not in use

⁸² Maxime Lalanne, *A Treatise on Etching*, trans. by S. R. Koehler (Boston: Page Co., 1880), 61.

⁸³ Gross, *Intaglio Printing*, 159.

⁸⁴ Fries, *Double Elephant Folio*, 140.

⁸⁵ Microscopic examination of dispersed pigment particles after the oil medium had been leached out with acetone.

until 1835.⁸⁶ These moist cakes had humectants, such as glycerin, honey or sugar water added to enable easy re-wetting.

It is always difficult to take paint samples from watercolors because of the small amount of paint available and its tendency to sink into the paper structure. Carefully, the following pigment samples were taken from Plates where there was sufficient paint, and examination under the microscope yielded the following results:

Plate	Sample color	Location	Identification
77	blue	back of top bird	Prussian blue
87	blue	tail feather, lower bird	Prussian blue
96	blue	tail feathers, lower bird	Prussian blue
96	black spots on blue	tail feathers, lower bird	unknown
102	blue	back, lower bird	cobalt, Prussian blue
113	blue	back, upper bird	Prussian blue
136	yellow	breast, left bird	chrome yellow
138	yellow	breast, lowest bird	gamboge (+ madder lake?)
142	orange	glaze, head, lowest bird	madder lake, gamboge
397	brown-orange	wing feathers, left bird	madder lake (+ red lead?)
411	brown-orange	spot under eye	red lead + madder lake
431	brown-orange	middle of beak	red lead

The samples were all mounted permanently on microscope slides with Araclor 5442 mounting medium. Each was examined with an Olympus BH-2 polarizing light microscope. All samples were magnified 400 times for identification except the last one from Plate 431 that had to be magnified 1000 times before a positive identification could be made. Identification was based on the following pigment characteristics: birefringence, refractive index, pleochroism, and particle morphology. Unfortunately, destructive microchemical testing could not be carried out on the tiny samples in order to confirm the above results.

These results are similar to a Canadian study that used a more sophisticated analytical technique: x-ray diffraction. The Volume examined in this study was dated 1827–1829. The pigments identified included Flemish white, red lead, chrome yellow, iron oxide, chalk, vermilion, organic red (probably madder lake), Prussian blue, cobalt blue, an organic blue (probably indigo), and white lead.⁸⁷ All of the pigments found in the Syracuse set except for gamboge were found in the Canadian study. All of these pigments were in common use in watercolors in the 1830s.

Victor Audubon made a reference to the use of ultramarine in a letter to Havell, dated 16

⁸⁶ Ralph Meyer, *A Dictionary of Art Terms and Techniques* (New York: Barnes and Noble, 1981), 427.

⁸⁷ Neil Adair and Gregory Young, "The Analysis of Watercolour Pigments from Audubon's *The Birds of America* Vol. I," *Journal of International Institute for Conservation-Canadian Group* 6 (Spring 1981): 15.

January 1832: “the Blue Bird in Plate No. 36 is colored with bad ultramarine which is now nearly black.”⁸⁸ No sample was taken from Plate 36 of the Syracuse set as it was easy to see that the blue had not discolored. Why ultramarine should turn black is a question difficult to answer. In the presence of dilute acids, it loses its color, but does not turn black.⁸⁹ Perhaps, another pigment or additive was present in the Havell’s “ultra-marine,” which caused the color change, or perhaps Victor was wrong in describing this color as ultramarine.

However, there are blue areas on other Plates that are darkening. On Plate 96, “Columbia Jay,” there are some black spots on the blue color. However, this blue pigment is Prussian blue, not ultramarine. The cause of these spots is not known either. Prussian blue in the presence of alkalis turns brown, but there is no reason to think that there is a strong alkaline substance present unless the Plates were de-acidified at one time. However, there is no other indication of this conservation treatment.

Another example is Plate 102, “Blue Jay.” The blue areas on the back of the lower bird are a mottled, gray-blue color, dingier than the rest of the bird. The same mottled areas appear on the original “Blue Jay” watercolor. The pigment sample taken from this Plate indicated that cobalt blue and Prussian blue were present, but no other pigments were identified. The grayish discoloration looks very like the darkening that white lead undergoes when it is used in a water-soluble medium after exposure to atmospheric pollution. It is possible that the two blues were mixed with white lead to lighten them, and to make them slightly opaque.

The problem with white lead and its mixtures is that on exposure to air pollution, specifically hydrogen sulfide, the basic lead carbonate changes to orange (in the presence of acids) then gray then to black lead sulfide.⁹⁰ This discoloration phenomenon is often seen on old master drawings where white lead (so-called “body colour” in England) was used as a highlight. (Its use in Japanese prints is also common and is considered to be a desirable patina.)

It seems that Audubon also had problems with this color. In a letter to Victor, he wrote,

Have the edges of the little *Grouse* (Young) [Plate 191] softened in the Engraving—The outer primary of the male bird is pure white, it is dirty in the drawing because the White colour I used happened to be *bad*.⁹¹

Of course, it is not possible to be absolutely sure that Audubon’s “White colour” was white lead, but it is such a notorious pigment for changing color, that it is certainly likely. Chinese white (zinc white) was introduced as a particularly dense, white watercolor pigment by

⁸⁸ Fries, *Double Elephant Folio*, 64.

⁸⁹ Rutherford Gettens and George Stout, *Painting Materials: A Short Encyclopedia* (1942, reprint, New York: Dover Publications, 1966), 164.

⁹⁰ *Ibid.*, 175.

⁹¹ Audubon, *Letters*, 1:254. Letter to Victor, dated 20 September 1833.

the London colormen, Winsor and Newton, in 1834.⁹² Perhaps in 1834, Havell changed from white lead to Chinese white to avoid this discoloration in later Plates. The presence of white lead in the Canadian study and in the Syracuse set both pre-date 1834.

Another pigment, red lead, has similar characteristics. This pigment, especially in watercolor, turns brown when in contact with nitric or acetic acid; white in the presence of hydrochloric acid; black, in sulfides; and chocolate brown, when exposed to high light levels and humidity for prolonged periods.⁹³ There are several Plates on which red lead watercolor appears to have been used. These are Plates 397, 411, 412, 416, 417, 427 and 431. In each case, these accents of color have halos of a reddish-orange color, but a brown crust partially covers the surface. In reproductions of the original watercolors in the collection of the New-York Historical Society, these areas on most of these Plates are supposed to be a very pale orange pink. It is possible that these highlights were done in a pigment other than red lead. On Plate 411, the accent under the eye is a mottled, brown-orange color.⁹⁴

Since the Plates do not exhibit general color fading from long exposures to light or high humidity, it can be assumed that the color change of red lead to brown is due to exposure to an acid. Alum breaks down to sulfuric acid, and it is possible that this has affected the red lead. Gettens and Stout note that the color change for red lead in the presence of sulfides is black. Under a microscope, a black film over a reddish orange color might be seen, leading to the conclusion that the surface color is brown. Unfortunately, it was not possible to examine any of the Plates under high magnification to verify this.

It is possible to change the discoloration products of chemically converted white and red lead through oxidation. However, this procedure usually involves using hydrogen peroxide in ether, and this treatment might also bleach the pigments lying next to or under the affected areas, as well as the paper. Since there is no way to effectively rinse or neutralize this bleach in bound books, it is not a recommended conservation procedure.

⁹² Gettens, *Painting Materials*, 177.

⁹³ *Ibid.*, 153.

⁹⁴ New-York Historical Society, *Original Watercolor Paintings*, both volumes *passim*.

CHAPTER IV

CONDITION OF THE SYRACUSE UNIVERSITY SET

Results of the conservation condition survey

The general condition of the four volumes is good considering the inherently weak style of binding and the handling they have received. Volume 1 exhibits more damage than Volume 2 and so on. This is probably due to the increased amount of handling that the first volume received based on the renown of Plate 1, "Wild Turkey." What follows is a condition summary of the various components of the volumes, namely the paper, the watercolors and the ink. A detailed discussion of the individual volumes follows these introductory paragraphs. The binding is discussed separately in Appendix E.

The paper, described in detail in Chapter 3, is in quite good condition despite the inflexible method used to bind the sheets into the heavy volumes. There are edge tears and creases throughout the volumes, and these are almost certainly due to the difficulty in turning the large sheets. The papers are, generally, off-white or cream in color. A few sheets are a light brown color, especially the eight J WHATMAN | TURKEY MILL | 1837 papers in Volume 4, but all the papers are flexible and not brittle. Because of their weight and size, they can be, however, easily torn (especially along the grain direction) and continued care must be taken when they are handled. Where other damage has occurred to the paper, it has been either from deliberate scraping by the printer or colorers to remove unwanted ink or color; from careless sanding of the paper surface by unknown persons to remove dirt or stains; or from accidental abrasion caused by objects being dropped onto or dragged across the surface, sometimes resulting in small holes or gouges.

The watercolors are in excellent condition. There is very little evidence that any of the colors have faded, and this is primarily because they have not been exposed to any light for prolonged periods. There are a few instances of damage to the colors from abrasion due to the causes listed above. The only other major damage is due to the chemical color changes of some of the pigments noted in the previous chapter.

The ink is also in excellent condition. Many of the same types of damage, particularly abrasion that have also affected the watercolors and papers, have damaged the ink. In a few instances, some printed letters have been scraped away from the Plate legends and corrections made with pen and ink. These are Plate 22, "Purple Martin," and Plate 385, "Bank Swallow and Violet-Green Swallow." The words "Purple Martin," "Riparia," and "Thalassinus" have been retouched presumably because mistakes had been made in the lettering on the plate or perhaps the printing was unclear. On Plate 47, "Ruby-throated Humming Bird," the title has been quite badly inked, and the letters are difficult to read.

A summary of the condition of each volume follows.

Volume 1. This volume is in fair condition. Many of the sewn blocks of Plates were either completely detached from the binding or loose and precarious. Tears along the edges, particularly the bottom edge, are found on many Plates, especially those at the beginning of the volume and in about the same place. On each Plate, there are varying amounts of surface dirt, caused primarily by the printer's inky hands, and the dirty hands of perusers. Areas particularly damaged by this are the bottom and top corners, and the lower edge of the recto and the verso.

In addition to these widespread damages, others, which are found intermittently, are equally disfiguring. Some of these are:

- small losses of the paper usually at the bottom corners or along tears;
- several types of stains that include large brown blotches (caused by the deterioration of the gelatin sizing?); small reddish-brown dots (caused by metal impurities, called "foxing"); ink specks offset from other prints of the same Plate stacked while still wet; brown staining from mold found on some of the darker pigments; and brown ghosting caused by migration of acids(?) from a preceding or succeeding Plate;
- small holes and gouges;
- dents or half-moon shaped marks caused by difficulty in turning the pages;
- areas that were scraped away by the printer or the colorer to remove ink lines or mistakes in coloring;
- intentional sanding of the paper surface.

This last damage seems to have been caused by someone working fairly recently to clean up the Plates in a misguided conservation treatment. There is one reference to the treatment of *The Birds of America* that specifically recommends removing "persistent dirt" by sanding the paper.⁹⁵

The paper used in Volume 1, primarily J WHATMAN | TURKEY MILL, is fairly flexible and an off white color. It is interesting to note, however, that, in this volume, the six Plates on J WHATMAN paper are thicker, more flexible and whiter than the J WHATMAN | TURKEY MILL papers made in the same year. Similar observations about these two papers were also made by Hanaburgh.⁹⁶

Volume 2. As might be expected, Volume 2 has many of the same types of damage found in Volume 1. There seems to be less damage caused by external forces, i.e. humans. There

⁹⁵ Horton, "Conservation Problems," 79.

⁹⁶ Hanaburgh, *Birds of America: Check List*, 3.

are fewer tears and losses, and less surface dirt. However, the amount of inherent damage from stains is very similar. The papers are flexible and in good condition, and when comparing J WHATMAN | TURKEY MILL and J WHATMAN papers, the same differences as noted for Volume 1 are seen.

Volume 3. Compared to the previous two volumes, this has less damage caused by handling. Unfortunately, there is one important exception to this. The first Plate in Volume 3, Plate 201, “Canada Goose,” is very severely damaged. The Plate has been folded back upon itself several times, and this has resulted in numerous tears and loss of media. Similar types of damage have occurred in the first four or five Plates in each volume including the title pages, but Plate 201 is the most affected. This damage has occurred by carelessly closing the books. Because of the grain direction, none of the pages flexed or draped particularly well parallel to the binding edge, and when the book was closed by simply grasping the front cover and shutting it, the front pages were caught before they could lie flat. Folds and creases resulted, and eventually tears formed. As in the earlier volumes, the papers show few differences apart from those already stated.

Volume 4. The most severely damaged page is the title page. Generally, the Plates exhibit very little physical damage, much less than any of those in the previous volumes. It is considered the volume in the best condition. Interestingly, on Plates 333 and 373, opaque white splashes were found in the colored areas. This substance turned out to be wax, probably dripped from a candle held by someone who was examining the Plates in the past century.

One of the most interesting aspects of this volume is the marked difference in the papers. Of the 135 Plates, only eight are on J WHATMAN | TURKEY MILL papers, the rest are on J WHATMAN papers. When the first sheet of J WHATMAN | TURKEY MILL paper is encountered, Plate 374, two differences are immediately noted: it is light brown in color and is substantially thinner than the J WHATMAN paper succeeding it. These differences also hold true for the other seven sheets. The color differences are probably due to increased alum in the J WHATMAN | TURKEY MILL papers. Unfortunately, until larger samples of the paper, other than minute scrapings, can be taken from the binding edge, there was no way to confirm this.

Paper thickness

The differences in paper thickness in Volumes 3 and 4 were measured with a micrometer. The values are in inches.

J WHATMAN			J WHATMAN TURKEY MILL		
Plate 296	date?	.0095	Plate 201	1834	.0095
Plate 315	1836	.0102	Plate 203	1834	.0090
Plate 336	1836	.0100	Plate 228	1834	.0085

Plate 358	1837	.0100	Plate 240	1834	.0100
Plate 375	1837	.0105	Plate 242	1835	.0100
Plate 379	1837	.0100	Plate 374	1837	.0083
Plate 415	1837	.0067	Plate 376	1837	.0110
title page	1838	.0100	Plate 378	1837	.0081

The average thicknesses for the two papers are quite similar: J WHATMAN: .0096 inch and J WHATMAN | TURKEY MILL: .0093 inch. However, large differences do occur. It must be pointed out, however, that the thinnest paper, which was measured randomly, was a J WHATMAN paper, Plate 415: .0067 inch.

Grain direction

Another property of the paper and its relationship to the condition of the Plates was mentioned by Horton,

The very pronounced grain of the paper is short, that is, the fibers run horizontally across the page rather than vertically parallel with the foreedge. This means the plates would have been easy to roll from top to bottom and put in a tube. But when bound in a book, the leaves resist arching when turned from right to left. Since the plates in the bound volumes are whip-stitched together, the plates will not open all the way to the binding margin...there is a tendency for the plates at the beginning and end of the volumes to crease from top to bottom as subsequent plates are turned over on top of them.⁹⁷

This discussion of the “very pronounced grain” direction in handmade paper is interesting. It is well known that papers made on machines, either cylinder or fourdrinier, have a marked grain or machine direction, particularly the former. For example, one encounters problems due to machine direction when tearing newsprint or a so-called mouldmade paper. The paper tears in a straight line in one direction, and unevenly in the other. The grain or machine direction in this type of paper is parallel to the straight tear edge. However, when a piece of western handmade paper is torn, there is very little difference in the way it tears.

Is there a pronounced grain direction in the Plates of *The Birds of America*? When the Plates were first pulled, a few were arched in both directions, and it was very obvious that the paper draped much more easily parallel to the short sides, just as Horton described.

What, then, causes grain direction in western handmade papers? When paper is made by hand, the papermaking mould is grasped by the short ends and dipped into the vat containing the fibrous pulp. The layer of pulp that first washes over the surface of the mould has a higher proportion of fibers oriented in one direction compared to those running in the opposite direction (however, the greatest number of fibers are randomly oriented). In other

⁹⁷ Horton, “Conservation Problems,” 73.

words, each fiber tries to orient itself so that it points into the wave created as the pulp washes across the surface of the mould—a motion parallel to the short sides. The water first drains out of the pulp on the surface of the mould, and therefore, that layer cannot be manipulated further. The uppermost layers of pulp, however, still contain a lot of water, and as the mould is shaken from side to side and back to front, the fibers move around more randomly. Once the water has drained out sufficiently so that the sheet can be couched (or transferred) onto the felt, the fiber orientation—grain direction—is set. This phenomenon is verified if a few colored threads are put into a vat containing a light-colored pulp, and a sheet is formed. The side of the paper formed next to the mould surface (wire side) will show most of the colored threads running parallel to the short ends, while those on the other side of the paper (felt side) will be randomly oriented.

The other property concerning grain direction and related to the planar distortions of the paper, is the expansion or stretch of the paper when wet—squareness. When wet, fibers swell and become much wider than long. If there is a greater proportion of fibers oriented in one direction, they will cause the sheet of paper to swell and become more wide than long. The Plates exhibit the same expansion problems: when damp or even slightly humid, the paper tends to expand from the top to the bottom (when viewing the Plates with the binding edge on the left).

When the prints were made from the copper plates, the paper was damp, and the force from the pressure distorted the paper more within the plate mark (where the paper was pressed and stretched, compared to the margins that were not). It is possible to reduce this distortion later, using dampening and flattening procedures, but the cockling tends to return unless the paper is adhered overall to a rigid support—neither flattening nor mounting the Plates is recommended. The fore-edges of the Plates exhibit slight undulations, overall, which run horizontally. These are probably the result of the Volumes being subjected to high humidity levels over long periods of time (perhaps when the volumes were in Natchez). Moisture gradually seeps into the pages from the edges of the volumes, and the paper starts to expand. When the book is closed, the weight of the pages prevents dramatic distortions, but because the paper at the gutter cannot move, the rest of the page tends to flare out. Once undulations are set in motion, all the sheets in an entire volume can exhibit the same pattern.

Offset and mold staining

Perhaps the most significant damage, which has been noted on many Plates, is the brown staining found on a Plate in the shape of the image either preceding or succeeding it. Fries states,

When these [the volumes] had been placed one on top of the other, their sheer weight has helped produce a chemical reaction between the oil and the pigments used and the bleach or chlorine in the Whatman paper, with the result that an impression of the bird of one print appears on the verso of the preceding print. This condition obtains particularly where the so-called earth colors or heavy browns and blacks were used.⁹⁸

Although it is almost impossible to identify any residues of chlorine after more than 150 years, a simple test for chlorine was run, and as expected, the results were negative.⁹⁹ It was also not possible to confirm that either the Balston or the Hollingworth mills used bleach to whiten the rags that were made into paper. If the rags were bleached and not rinsed completely, leaving behind significant amounts of chlorine, it is unlikely that they would now be in such good condition. The staining is more likely to be the result of the acid in the oil of the printing ink migrating into the papers on either side of the Plate.

In most cases where this type of staining is severe, the color of the paper under the heaviest areas of ink on the verso of the offsetting Plate is a greenish brown. On the verso of the preceding Plate (the other paper surface closest to the ink), the offset stain is very brown. This stain may indeed penetrate onto that Plate's recto and go on to the preceding Plate, etc. On the recto of the succeeding Plate (the paper surface closest to the verso of the offsetting Plate), the image again is brown, but usually not as prominent as that found on the preceding Plate. The intensity of the offset image decreases as the distance from the offending Plate increases.

Occasionally, however, the offset staining seems to skip Plates. In other words, if Plate A is heavily inked, Plate B is skipped, and Plate C is stained. This would mean that there is something in Plate B that resists staining yet transmits the cause of the stain to the more vulnerable Plate C. One theory is that Plate B is protected by a buffering agent, such as gelatin sizing. Another theory is that Plate B is less acidic than Plate C, and therefore less affected by acid from the oil. To prove either of these theories, much larger samples from affected papers must be obtained, and controlled research with mock-ups might lead to some conclusions.

Usually, the Plates most severely affected by this staining are the fifth Plate in each Number: a small-size Plate, which precedes the first Plate in each Number, a large-size Plate. Following the large Plate, the second, medium-size Plate is often affected, and can in turn offset onto the third Plate, another small-size Plate.

Regarding problems associated with the brown and black watercolor areas on some of the heavier applications of watercolor, Fries mentions that these areas, especially, contribute to offset staining. It is more likely that under these areas, the printing ink is heavier, and there may be some plate tone (more acid from the ink). The other problem in these areas is the mold

⁹⁸ Fries, *Double Elephant Folio*, 44.

⁹⁹ Deionized water was applied to surface, and starch-potassium iodide test strip placed on the area. If chlorine was present, the white test strip would have turned purple.

growth that is occasionally found on them. Although the presence of mold could not be substantiated by analysis, it has the visual characteristics expected: woolly, white growths spreading out from a center. It is possible that these dark colors may have had more gum medium or sugar added in order to make them appear saturated: darker, richer and more transparent. It is equally possible that a glaze was applied over these areas as a kind of varnish to achieve the same saturation effect. This kind of rich medium or glaze would be a nutritive substance more susceptible to mold growth. An obvious glaze was not apparent under normal lighting conditions, but it would be wrong to exclude that possibility until more sophisticated methods of analysis or examination can be carried out.

Preservation and conservation recommendations

The ideal conditions under which to preserve *The Birds of America* would be to shut them away in the cold and dark with no human contact. Obviously, to hide these away from an appreciating public would be a crime. The fact that these beautiful Plates have been in volumes that have been locked up, only to be looked at by a select number of trusted University faculty or library staff, has reduced the risk of deterioration. Yet, there is little point in having a beautiful object if it cannot be appreciated first hand by a larger audience.

The practical solution to the preservation problem is to reduce the risks to the Plates as much as possible while making them more accessible. To this end (as well as to safeguard the Plates against damage from deteriorating bindings), the volumes were disbound. Each Plate was then inserted into a Mylar folder.¹⁰⁰ The folders are made from two sheets of .005 inch (5-mil) polyester film. The two sheets were heat-welded together along one long edge. (In retrospect, it would have been easier to handle the large Plates if the two sheets of Mylar had been welded along one short end at the top to match the grain direction of the paper). A sheet of buffered paper was placed behind each Plate in the Mylar folder. Each Plate fits into the folder with an inch margin on the open sides. The Mylar folder gives each Plate much needed support and flexibility. Nevertheless, each must still be handled carefully to avoid further damage. Metal map storage drawers will be used for permanent storage.

Plans for the display of the Plates will include a system whereby the Plates can be installed in specially designed frames without the necessity of individual mats. This will allow the frequent display and rotation of Plates. If they are not to be on display for extended periods of time, e.g., for no more than a month, existing light levels from UV-absorbing, sleeved fluorescent lights or incandescent lights are acceptable in the display area or reading room of

¹⁰⁰ Mylar D is an inert polyester film made by Dupont Inc. Note: in 2009, Mylar is no longer available and a comparable polyester film is Melinex 516.

the Arents Library. Lower light levels simply do not allow the beauty of these Plates to be appreciated. The temperature and relative humidity levels should not exceed 70°F and 60% RH.

The goal of a conservation treatment plan should be to stabilize the Plates, and avoid any treatment that might put them at any unacceptable risk. Specific conservation treatment proposals for the Plates must be considered on a case by case basis, but general recommendations are as follows.

All Plates have some surface dirt: dust, inky and dirty fingerprints. This dirt can probably be reduced using non-abrasive erasers. Sanding or scraping is not recommended. The old patches should be removed, tears repaired, creases reinforced where possible, and losses replaced with inserts. Remnants of hard, brittle glue along the binding edges of the disbound Plates must be removed, and the edges repaired and flattened where necessary. The ink accretions on the verso of some of the Plates should not be removed as they do not cause any damage and provide interesting technical information about the process. The old, inactive mold growths should be removed using a small vacuum cleaner, avoiding any abrasion to the colors underneath.

There are several types of problems that should not be treated because unacceptable damage to the Plates will probably result. These problems include: the brown staining caused by offset from acidic ink oil, staining from mold, and discoloration from white lead paint mixtures or red lead watercolor. Any overall discoloration of the paper and specific staining cannot be dealt with except by washing and possible bleaching. These procedures are not considered necessary to significantly increase the longevity of the Plates.

It is interesting to note that the author and other conservators have successfully treated a number of Plates by washing and light-bleaching. It is also true that other Plates have been ruined by water treatments. It is imperative to note, however, that the former Plates had been removed from their volumes some time ago and have been on display in frames for many decades. Experiments have shown that, if gum arabic is exposed for long periods to light, it becomes increasingly insoluble in water. For this reason, previously disbound Plates that have been exposed to light for a long time can probably be successfully treated with aqueous solutions, whereas recently unbound Plates should not be washed or deacidified. (Chlorine or other oxidizing or reducing bleaching, other than light, is still not recommended, however.)

Theoretically, a case can be made for depositing an alkaline reserve (de-acidification) in the Plates to prevent further acid degradation. However, to achieve this end, the Plates would have to be treated with an aqueous alkaline solution that might cause distortions in the paper, spots or streaks, potential migration of some colors to the verso, and conversion of alkaline-sensitive watercolors to other colors, such as Prussian blue to brown. Horton recommended applying an aqueous alkaline reserve solution to the margins only, but this is inadvisable as

certain areas of the paper would then exhibit quite different aging characteristics and disfiguring tide lines would undoubtedly form.¹⁰¹ Non-aqueous, alkaline reserve solutions would eliminate some of the problems generated by the use of aqueous solutions, but spotting and streaking might still be possible. Also, the solubility of gamboge, a yellow resin pigment often used on the Plates, by the organic solvent solutions would occur.

With proper storage, handling and display, the Plates probably will not deteriorate further. The fact that the ones in Mylar folders are separated from each other will also, it is hoped, prevent further staining.

¹⁰¹ Horton, "Conservation Problems," 80.

APPENDIX A COUNTERMARKS

As described in Chapter II, the countermark on each of the Plates proved to be of great value in determining the date of each Plate, volume, and the set as a whole. Below are the formats of the two countermarks as found in the paper (“1832” is an example):

J WHATMAN
TURKEY MILL
1832

J WHATMAN
1832

The range of countermark dates found in the Syracuse set is 1830–1838. The position of the countermarks on the two papers are different. The J WHATMAN | TURKEY MILL countermarks are positioned very close to one long edge of the sheet, and the date, being closest to the edge, is usually trimmed or bound into the gutter so that identification of that countermark is sometimes impossible. The J WHATMAN countermark is closer to the center of the sheet, and therefore the dates are easier to read. If a date on the J WHATMAN paper could not be identified, it is probably due to heavy inking or coloring in that area. These areas do not permit the use of transmitted light, although sometimes a strong raking, or side light, shone on the verso will help as the countermarks often appear impressed in the surface of the paper.

The following list of countermarks includes: the Plate number or page description, the countermark and date, and the location of the countermark on the sheet. The countermark dates are given as in the following examples: 1832 when all or enough of date can be seen for positive identification; (1832) when enough of date can be seen for tentative identification; and 183– when the last digit cannot be identified.

The location of the countermarks is given in the following manner—the gutter (the binding edge) is always to the left—: the gutter, top: **G.T.**; gutter, bottom: **G.B.**; fore-edge, top: **F.T.**; fore-edge, bottom: **F.B.** (For the approximate location of the countermark relative to the sheet size and the plate mark, see the condition survey forms housed in a separate binding in the Arents Library, Syracuse University). The fact that the countermarks appear at either the top or the bottom of the paper indicates that the printer(s) did not adhere to a policy whereby the “right” or “wrong” side of the sheet would carry the image. Traditionally the “right” side of the sheet is the wire side, the one that is in direct contact with the surface of the papermaking hand mould. (The felt side is the one that is couched, or transferred, onto the felt after formation.) With the wire side facing you, the watermark is read correctly when viewed in transmitted light. In this case, therefore, the wire countermarks (as well as any wire or light-and-shade watermarks) have to be sewn on the surface of the mould cover in reverse. In the author’s

experience, however, water- and countermarks have appeared both right- and wrong-reading when viewed from the wire side of papers and on mould covers, so there does not seem to have been hard and fast rules about this.

The | denotes that what follows the slash is centered on the next line.

Plate Number/Page	Countermark and Date	Location
Volume 1		
Endpaper	no countermark	
Title Page	J WHATMAN TURKEY MILL 1838	F.T.
1	J WHATMAN TURKEY MILL 183-	F.B.
2	J WHATMAN TURKEY MILL 183-	G.T.
3	J WHATMAN TURKEY MILL 1832	G.B.
4	J WHATMAN TURKEY MILL 183-	G.T.
5	J WHATMAN TURKEY MILL 1832	G.B.
6	J WHATMAN TURKEY MILL 1832	F.B.
7	J WHATMAN TURKEY MILL 1832	F.B.
8	J WHATMAN TURKEY MILL 1832	G.B.
9	J WHATMAN TURKEY MILL 183-	G.T.
10	J WHATMAN TURKEY MILL 1832	G.B.
11	J WHATMAN TURKEY MILL 1832	G.B.
12	J WHATMAN TURKEY MILL 183-	F.B.
13	J WHATMAN TURKEY MILL 1832	G.B.
14	J WHATMAN TURKEY MILL 1832	F.T.
15	J WHATMAN TURKEY MILL 183-	F.B.
16	J WHATMAN TURKEY MILL 183-	F.B.
17	J WHATMAN TURKEY MILL 183-	F.B.
18	J WHATMAN TURKEY MILL 183-	F.T.
19	J WHATMAN TURKEY MILL 1832	G.T.
20	J WHATMAN TURKEY MILL 183-	G.T.
21	J WHATMAN TURKEY MILL 1832	G.B.
22	J WHATMAN TURKEY MILL 1832	F.B.
23	J WHATMAN TURKEY MILL 183-	G.T.
24	J WHATMAN TURKEY MILL 1832	G.T.
25	J WHATMAN TURKEY MILL 1832	F.T.
26	J WHATMAN TURKEY MILL 183-	F.B.
27	J WHATMAN TURKEY MILL 183-	F.B.
28	J WHATMAN TURKEY MILL 1832	G.T.
29	J WHATMAN TURKEY MILL 183-	F.T.
30	J WHATMAN TURKEY MILL 183-	F.B.
31	J WHATMAN TURKEY MILL 183-	G.B.
32	J WHATMAN TURKEY MILL 1832	F.B.
33	J WHATMAN TURKEY MILL 183-	F.B.
34	J WHATMAN TURKEY MILL 183-	F.B.
35	J WHATMAN TURKEY MILL 183-	G.T.
36	J WHATMAN TURKEY MILL 1832	G.B.
37	J WHATMAN TURKEY MILL 1832	G.T.
38	J WHATMAN TURKEY MILL 183-	F.B.
39	J WHATMAN TURKEY MILL 1832	G.T.
40	J WHATMAN TURKEY MILL 1832	G.B.
41	J WHATMAN TURKEY MILL 1832	G.B.
42	J WHATMAN TURKEY MILL 1832	G.T.

43	J WHATMAN TURKEY MILL 183-	F.T.
44	J WHATMAN TURKEY MILL 1832	G.T.
45	J WHATMAN TURKEY MILL (1832)	F.T.
46	J WHATMAN 1832	G.T.
47	J WHATMAN TURKEY MILL 1832	G.T.
48	J WHATMAN TURKEY MILL 1832	G.T.
49	J WHATMAN TURKEY MILL 1832	G.T.
50	J WHATMAN TURKEY MILL 1832	G.T.
51	J WHATMAN TURKEY MILL (1832)	F.T.
52	J WHATMAN TURKEY MILL 1832	G.T.
53	J WHATMAN TURKEY MILL 1832	G.T.
54	J WHATMAN TURKEY MILL (1832)	F.T.
55	J WHATMAN TURKEY MILL 1832	G.T.
56	J WHATMAN 183-	G.T.
57	J WHATMAN TURKEY MILL 183-	F.T.
58	J WHATMAN TURKEY MILL 1832	G.T.
59	J WHATMAN TURKEY MILL 1832	F.B.
60	J WHATMAN TURKEY MILL 1832	G.T.
61	J WHATMAN TURKEY MILL 183-	F.T.
62	J WHATMAN TURKEY MILL 1832	G.B.
63	J WHATMAN TURKEY MILL (1832)	F.T.
64	J WHATMAN TURKEY MILL 1832	G.B.
65	J WHATMAN TURKEY MILL 1832	G.B.
66	J WHATMAN TURKEY MILL 1832	F.T.
67	J WHATMAN TURKEY MILL (1832)	F.T.
68	J WHATMAN TURKEY MILL (1832)	F.B.
69	J WHATMAN TURKEY MILL (1832)	F.B.
70	J WHATMAN TURKEY MILL (1832)	F.B.
71	J WHATMAN TURKEY MILL (1832)	F.B.
72	J WHATMAN TURKEY MILL 183-	F.T.
73	J WHATMAN TURKEY MILL 1832	G.B.
74	J WHATMAN TURKEY MILL (1832)	F.B.
75	J WHATMAN TURKEY MILL (1832)	F.T.
76	J WHATMAN TURKEY MILL) 1832	G.T.
77	J WHATMAN TURKEY MILL 1832	F.T.
78	J WHATMAN TURKEY MILL 1832	G.B.
79	J WHATMAN TURKEY MILL (1832)	F.B.
80	J WHATMAN TURKEY MILL 1832	G.B.
81	J WHATMAN TURKEY MILL 1832	F.T.
82	J WHATMAN 1832	F.B.
83	J WHATMAN TURKEY MILL 1832	G.B.
84	J WHATMAN TURKEY MILL 1832	G.B.
85	J WHATMAN 1831	F.T.
86	J WHATMAN 1832	F.B.
87	J WHATMAN TURKEY MILL (1832)	F.B.
88	J WHATMAN TURKEY MILL (1832)	F.B.
89	J WHATMAN TURKEY MILL 1832	G.B.
90	J WHATMAN TURKEY MILL (1832)	F.T.
91	J WHATMAN TURKEY MILL 1832	F.T.
92	J WHATMAN 1832	G.T.
93	J WHATMAN TURKEY MILL (1832)	G.T.
94	J WHATMAN TURKEY MILL 1832	F.B.
95	J WHATMAN TURKEY MILL 1832	F.T.

96	J WHATMAN TURKEY MILL 1832	F.T.
97	J WHATMAN TURKEY MILL 183-	G.T.
98	J WHATMAN TURKEY MILL 1832	F.T.
99	J WHATMAN TURKEY MILL 1832	G.B.
100	J WHATMAN TURKEY MILL 1833	F.T.
Endpaper	no countermark	

Volume 2

Endpaper	no countermark	
Title Page	J WHATMAN TURKEY MILL 183-	G.B.
101	J WHATMAN 1831	G.T.
102	J WHATMAN TURKEY MILL 1832	G.B.
103	J WHATMAN 1830	G.B.
104	J WHATMAN 1831	F.B.
105	J WHATMAN 1831	G.T.
106	J WHATMAN TURKEY MILL (1832)	F.B.
107	J WHATMAN TURKEY MILL 183-	F.B.
108	J WHATMAN TURKEY MILL 1833	G.T.
109	J WHATMAN TURKEY MILL 183-	F.B.
110	J WHATMAN 1831	G.T.
111	J WHATMAN TURKEY MILL 1832	G.B.
112	J WHATMAN TURKEY MILL 183-	G.B.
113	J WHATMAN TURKEY MILL 1833	G.B.
114	J WHATMAN TURKEY MILL 1833	G.B.
115	J WHATMAN 1831	G.B.
116	J WHATMAN TURKEY MILL 1833	F.T.
117	J WHATMAN TURKEY MILL 1832	G.B.
118	J WHATMAN 1831	G.T.
119	J WHATMAN 1831	G.T.
120	J WHATMAN 1831	G.B.
121	J WHATMAN TURKEY MILL (1833)	F.B.
122	J WHATMAN TURKEY MILL 1833	G.B.
123	J WHATMAN 1831	F.B.
124	J WHATMAN TURKEY MILL 1833	G.B.
125	J WHATMAN 1831	F.T.
126	J WHATMAN TURKEY MILL 1833	G.T.
127	J WHATMAN 1832	F.T.
128	J WHATMAN 1832	G.B.
129	J WHATMAN 1831	F.T.
130	J WHATMAN 1831	G.B.
131	J WHATMAN 1832	G.T.
132	J WHATMAN TURKEY MILL 1833	G.B.
133	J WHATMAN 1832	G.T.
134	J WHATMAN 1832	G.T.
135	J WHATMAN 1832	G.T.
136	J WHATMAN TURKEY MILL 1833	F.T.
137	J WHATMAN 1832	G.T.
138	J WHATMAN 1832	F.B.
139	J WHATMAN 1832	G.B.
140	J WHATMAN 1832	G.B.
141	J WHATMAN TURKEY MILL 1832	G.B.
142	J WHATMAN 1832	G.T.
143	J WHATMAN TURKEY MILL (1832)	F.B.

144	J WHATMAN 1832	G.T.
145	J WHATMAN 1832	F.B.
146	J WHATMAN 1832	G.T.
147	J WHATMAN 1832	F.B.
148	J WHATMAN 1832	G.B.
149	J WHATMAN 1832	F.B.
150	J WHATMAN TURKEY MILL 1832	G.B.
151	J WHATMAN TURKEY MILL 183-	G.B.
152	J WHATMAN 1832	F.B.
153	J WHATMAN 1832	G.T.
154	J WHATMAN TURKEY MILL 183-	G.B.
155	J WHATMAN TURKEY MILL 1832	F.B.
156	J WHATMAN TURKEY MILL 183-	F.B.
157	J WHATMAN TURKEY MILL 1832	F.T.
158	J WHATMAN TURKEY MILL 1832	F.B.
159	J WHATMAN 1833	G.T.
160	J WHATMAN 1833	F.B.
161	J WHATMAN 1833	G.T.
162	J WHATMAN TURKEY MILL 183-	G.T.
163	J WHATMAN TURKEY MILL 1833	F.T.
164	J WHATMAN TURKEY MILL 1833	F.T.
165	J WHATMAN 1833	F.B.
166	J WHATMAN TURKEY MILL 1833	G.B.
167	J WHATMAN 1833	F.B.
168	J WHATMAN 1833	F.T.
169	J WHATMAN TURKEY MILL 1833	F.B.
170	J WHATMAN 1833	G.T.
171	J WHATMAN TURKEY MILL 1833	G.B.
172	J WHATMAN 1833	G.T.
173	J WHATMAN 1833	G.B.
174	J WHATMAN TURKEY MILL 1833	F.T.
175	J WHATMAN TURKEY MILL 1833	F.T.
176	J WHATMAN 1833	G.B.
177	J WHATMAN 1833	G.T.
178	J WHATMAN 1833	F.T.
179	J WHATMAN 1833	G.T.
180	J WHATMAN 1833	F.T.
181	J WHATMAN 1833	F.T.
182	J WHATMAN 1833	G.B.
183	J WHATMAN 1833	F.T.
184	J WHATMAN TURKEY MILL 1833	F.T.
185	J WHATMAN 1833	G.T.
186	J WHATMAN 1834	G.B.
187	J WHATMAN 1834	F.T.
188	J WHATMAN TURKEY MILL 1833	G.B.
189	J WHATMAN 1834	F.T.
190	J WHATMAN 1833	F.B.
191	J WHATMAN 1834	G.B.
192	J WHATMAN 1834	G.T.
193	J WHATMAN 1834	G.T.
194	J WHATMAN 1834	G.B.
195	J WHATMAN 1834	F.T.
196	J WHATMAN 1834	G.B.

197	J WHATMAN 1834	G.B.
198	J WHATMAN TURKEY MILL 1834	F.T.
199	J WHATMAN TURKEY MILL 1834	F.T.
200	J WHATMAN 1834	F.T.
Endpaper	no countermark	

Volume 3

Endpaper	no countermark	
Title Page	J WHATMAN 1836	F.B.
201	J WHATMAN TURKEY MILL 1834	F.T.
202	J WHATMAN TURKEY MILL 1834	F.T.
203	J WHATMAN TURKEY MILL 1834	F.B.
204	J WHATMAN TURKEY MILL 1834	G.B.
205	J WHATMAN TURKEY MILL 1834	G.B.
206	J WHATMAN TURKEY MILL 1834	F.T.
207	J WHATMAN TURKEY MILL 1834	G.B.
208	J WHATMAN TURKEY MILL 1834	F.T.
209	J WHATMAN TURKEY MILL 1834	F.T.
210	J WHATMAN TURKEY MILL 1834	G.B.
211	J WHATMAN TURKEY MILL 1834	G.T.
212	J WHATMAN TURKEY MILL 1834	G.B.
213	J WHATMAN TURKEY MILL 1834	G.B.
214	J WHATMAN TURKEY MILL 1834	F.B.
215	J WHATMAN TURKEY MILL 1834	F.T.
216	J WHATMAN TURKEY MILL 1834	G.B.
217	J WHATMAN TURKEY MILL 1834	F.B.
218	J WHATMAN TURKEY MILL 1834	G.B.
219	J WHATMAN TURKEY MILL 1834	F.B.
220	J WHATMAN TURKEY MILL 1834	F.B.
221	J WHATMAN TURKEY MILL 1834	F.B.
222	J WHATMAN TURKEY MILL 1834	F.T.
223	J WHATMAN TURKEY MILL 1834	G.T.
224	J WHATMAN TURKEY MILL 1834	F.T.
225	J WHATMAN TURKEY MILL 1834	F.T.
226	J WHATMAN TURKEY MILL 1834	G.T.
227	J WHATMAN TURKEY MILL 1834	F.B.
228	J WHATMAN TURKEY MILL 1834	G.T.
229	J WHATMAN TURKEY MILL 1834	F.T.
230	J WHATMAN TURKEY MILL 1834	G.B.
231	J WHATMAN TURKEY MILL 1834	F.T.
232	J WHATMAN TURKEY MILL 1834	G.T.
233	J WHATMAN TURKEY MILL 1834	G.B.
234	J WHATMAN TURKEY MILL 1834	F.B.
235	J WHATMAN TURKEY MILL 1834	F.B.
236	J WHATMAN TURKEY MILL 183-	G.B.
237	J WHATMAN TURKEY MILL 1834	G.T.
238	J WHATMAN 1834	F.T.
239	J WHATMAN TURKEY MILL 1835	F.T.
240	J WHATMAN TURKEY MILL 1834	F.T.
241	J WHATMAN TURKEY MILL 1834	G.T.
242	J WHATMAN TURKEY MILL 1835	G.T.
243	J WHATMAN 1834	G.B.
244	J WHATMAN 1835	F.B.

245	J WHATMAN 1834	F.T.
246	J WHATMAN TURKEY MILL 1835	G.B.
247	J WHATMAN TURKEY MILL 1835	F.T.
248	J WHATMAN TURKEY MILL 1835	G.T.
249	J WHATMAN TURKEY MILL 1835	G.T.
250	J WHATMAN TURKEY MILL 1835	F.B.
251	J WHATMAN TURKEY MILL 1835	F.T.
252	J WHATMAN TURKEY MILL 1835	F.T.
253	J WHATMAN TURKEY MILL 1835	G.B.
254	J WHATMAN 1834	F.B.
255	J WHATMAN 1834	G.B.
256	J WHATMAN 1835	F.T.
257	J WHATMAN 1834	G.B.
258	J WHATMAN 1834	F.B.
259	J WHATMAN 1835	G.T.
260	J WHATMAN 1835	G.T.
261	J WHATMAN 1834	G.T.
262	J WHATMAN 1835	F.B.
263	J WHATMAN 1835	G.B.
264	J WHATMAN 1835	F.B.
265	J WHATMAN 1835	F.B.
266	J WHATMAN 1835	F.T.
267	J WHATMAN 1835	F.T.
268	J WHATMAN 1835	F.T.
269	J WHATMAN 1835	G.T.
270	J WHATMAN 1835	G.T.
271	J WHATMAN 1835	F.T.
272	J WHATMAN 1835	G.T.
273	J WHATMAN 1835	G.T.
274	J WHATMAN 1835	F.T.
275	J WHATMAN 1835	G.T.
276	J WHATMAN 1835	F.T.
277	J WHATMAN 1836	F.B.
278	J WHATMAN 1835	F.T.
279	J WHATMAN 1836	G.T.
280	J WHATMAN 1836	F.T.
281	J WHATMAN 1836	G.T.
282	J WHATMAN 1836	G.B.
283	J WHATMAN 1836	G.B.
284	J WHATMAN 1836	G.B.
285	J WHATMAN 1836	F.T.
286	J WHATMAN 1836	F.B.
287	J WHATMAN 1836	F.T.
288	J WHATMAN 1836	G.B.
289	J WHATMAN 1836	G.B.
290	J WHATMAN 1836	G.B.
291	J WHATMAN 183-	G.T.
292	J WHATMAN 1836	G.B.
293	J WHATMAN 1836	G.T.
294	J WHATMAN 1836	F.B.
295	J WHATMAN 1836	F.T.
296	J WHATMAN 183-	F.B.
297	J WHATMAN 1836	F.T.

298	J WHATMAN 1836	G.B.
299	J WHATMAN 1836	F.T.
300	J WHATMAN 1836	G.B.
Endpaper	no countermark	

Volume 4

Endpaper	no countermark	
Title Page	J WHATMAN 1838	F.B.
301	J WHATMAN 183-	F.B.
302	J WHATMAN 1836	G.T.
303	J WHATMAN 1836	F.T.
304	J WHATMAN 1836	F.T.
305	J WHATMAN 1836	G.B.
306	J WHATMAN 1836	F.T.
307	J WHATMAN 1836	F.T.
308	J WHATMAN 1836	F.T.
309	J WHATMAN 1836	F.T.
310	J WHATMAN 1836	G.T.
311	J WHATMAN 1836	G.T.
312	J WHATMAN 1836	G.B.
313	J WHATMAN 1836	F.B.
314	J WHATMAN 1836	F.T.
315	J WHATMAN 1836	G.B.
316	J WHATMAN 1836	G.B.
317	J WHATMAN 1836	G.B.
318	J WHATMAN 1836	G.B.
319	J WHATMAN 1836	G.B.
320	J WHATMAN 1836	G.B.
321	J WHATMAN 1836	G.B.
322	J WHATMAN 1836	F.B.
323	J WHATMAN 1836	F.T.
324	J WHATMAN 1836	F.B.
325	J WHATMAN 1836	G.B.
326	J WHATMAN 1836	G.T.
327	J WHATMAN 1836	G.T.
328	J WHATMAN 1836	G.B.
329	J WHATMAN 1836	G.T.
330	J WHATMAN 1836	G.B.
331	J WHATMAN 1836	F.T.
332	J WHATMAN 1836	G.B.
333	J WHATMAN 1836	G.T.
334	J WHATMAN 1836	F.T.
335	J WHATMAN 1836	F.B.
336	J WHATMAN 1836	G.T.
337	J WHATMAN 1836	G.B.
338	J WHATMAN 1836	F.B.
339	J WHATMAN 1836	G.T.
340	J WHATMAN 1836	F.B.
341	J WHATMAN 1836	G.B.
342	J WHATMAN 1836	F.B.
343	J WHATMAN 1836	F.B.
344	J WHATMAN 1836	G.B.
345	J WHATMAN 1836	G.B.

346	J WHATMAN 1836	F.B.
347	J WHATMAN 1836	F.T.
348	J WHATMAN 1836	F.B.
349	J WHATMAN 1836	F.B.
350	J WHATMAN 1836	G.T.
351	J WHATMAN 1837	F.T.
352	J WHATMAN 1836	F.T.
353	J WHATMAN 1837	G.T.
354	J WHATMAN 1837	F.B.
355	J WHATMAN 1837	F.T.
356	J WHATMAN 1837	G.T.
357	J WHATMAN 1837	F.T.
358	J WHATMAN 1837	G.B.
359	J WHATMAN 1837	G.T.
360	J WHATMAN 1837	G.B.
361	J WHATMAN 1837	F.T.
362	J WHATMAN 1837	F.B.
363	J WHATMAN 1837	F.T.
364	J WHATMAN 1837	G.B.
365	J WHATMAN 1837	F.T.
366	J WHATMAN 1837	F.T.
367	J WHATMAN 1837	G.B.
368	J WHATMAN 1837	G.T.
369	J WHATMAN 1837	F.B.
370	J WHATMAN 1837	G.T.
371	J WHATMAN 1837	F.B.
372	J WHATMAN 1837	F.B.
373	J WHATMAN 1837	G.B.
374	J WHATMAN TURKEY MILL 1837	G.B.
375	J WHATMAN 1837	G.B.
376	J WHATMAN TURKEY MILL 1837	G.T.
377	J WHATMAN 1837	F.B.
378	J WHATMAN TURKEY MILL 1837	G.B.
379	J WHATMAN 1837	G.T.
380	J WHATMAN TURKEY MILL 1837	F.T.
381	J WHATMAN TURKEY MILL 1837	F.B.
382	J WHATMAN 1837	G.T.
383	J WHATMAN 1837	F.T.
384	J WHATMAN 1837	F.B.
385	J WHATMAN TURKEY MILL 1837	F.T.
386	J WHATMAN TURKEY MILL 1837	F.T.
387	J WHATMAN 1837	F.T.
388	J WHATMAN 1837	G.T.
389	J WHATMAN 1837	F.B.
390	J WHATMAN 1837	G.B.
391	J WHATMAN 1837	G.T.
392	J WHATMAN 1837	G.T.
393	J WHATMAN 1837	G.T.
394	J WHATMAN TURKEY MILL 1837	G.T.
395	J WHATMAN 1837	F.T.
396	J WHATMAN 1837	F.B.
397	J WHATMAN 1837	G.B.
398	J WHATMAN 1837	F.B.

399	J WHATMAN 1837	G.T.
400	J WHATMAN 1837	F.B.
401	J WHATMAN 1837	G.B.
402	J WHATMAN 1837	G.T.
403	J WHATMAN 1837	G.B.
404	J WHATMAN 1837	G.B.
405	J WHATMAN 1837	G.B.
406	J WHATMAN 1838	F.B.
407	J WHATMAN 1837	G.T.
408	J WHATMAN 1837	F.B.
409	J WHATMAN 1837	F.T.
410	J WHATMAN 1838	G.B.
411	J WHATMAN 1838	F.B.
412	J WHATMAN 1838	G.T.
413	J WHATMAN 1838	F.B.
414	J WHATMAN 1838	G.B.
415	J WHATMAN 1837	G.T.
416	J WHATMAN 1838	G.B.
417	J WHATMAN 1838	F.T.
418	J WHATMAN 1838	G.B.
419	J WHATMAN 1838	G.T.
420	J WHATMAN 1838	G.B.
421	J WHATMAN 1838	G.T.
422	J WHATMAN 1838	F.T.
423	J WHATMAN 1838	G.B.
424	J WHATMAN 1838	G.B.
425	J WHATMAN 1838	G.T.
426	J WHATMAN 1838	G.B.
427	J WHATMAN 1838	F.T.
428	J WHATMAN 1838	F.T.
429	J WHATMAN 1838	G.T.
430	J WHATMAN 1838	G.B.
431	J WHATMAN 1838	G.B.
432	J WHATMAN 1838	F.T.
433	J WHATMAN 1838	G.B.
434	J WHATMAN 1838	F.B.
435	J WHATMAN 1838	G.B.
endpaper	no countermark	

APPENDIX B

LEGENDS

The legends printed on each Plate include the Number number (Arabic), the Plate number (Roman), credit lines for the artist and the engraver(s), the bird's common and scientific names, the person who named the bird, the sex, age and plumage descriptions of each bird, flora and fauna information, and location of scene. Plumage descriptions, botanical information, and locations are not found on all Plates, however. There is no other nomenclature included on the Plates with the exception of Plate 431, "American Flamingo." This Plate contains descriptions of the morphology of the bill, mandible, tongue and foot, together with illustrations at the top of the Plate.

The following is a complete list of all engraved legend information found on Plates 1–15, and using various type styles and point sizes, an attempt has been made to give the reader a sense of the appearance of the legends. The location of various parts of the legend within the plate marks differs somewhat from Plate to Plate and Volume to Volume. The Number and Plate numbers always appear over the image, on the left and right side, respectively, while the rest of the information usually appears under the image.

In a letter, dated 2 March 1831, Audubon specifically requested uniformity from Havell with regard to the positioning and format of the legends. It is almost certain, therefore, given the dates of the Syracuse set, 1832–1838, that all corrections regarding legend format had been made by Havell before the printing of these Plates commenced. In the same letter, Audubon set out standards for the size of the letters:

For the largest plates, let the letters not be larger than those of Plate 46. N. 10. For the middle-sized plates, let them be the size of Plate 47. N. 10 For the small plates, as in Plate 64. N. 13. Be sure not to have any at the *top* of the plates, not to make capital letters where they should be small, and to have the whole uniform. no flourishes, The dots (.,) to be as in the manuscript.¹⁰²

When the legends are examined in the Syracuse set and other sets mentioned by Fries, it is apparent that Havell and the letter engraver did not strictly adhere to Audubon's recommendations, especially with regard to the punctuation.¹⁰³ This is probably because Audubon himself did not adhere to a formula. Perusal of the reproductions of the original watercolor drawings used for *The Birds of America* revealed that Audubon did not consistently use a particular format for punctuation or other details.¹⁰⁴ In the end, it must have been up to

¹⁰² Fries, *Double Elephant Folio*, 214.

¹⁰³ *Ibid.*, 209–224, 421–439.

¹⁰⁴ New-York Historical Society, *Original Watercolor Paintings*, 2 vols. *passim*.

Havell and the letter engravers to set a standard. Certainly in Volumes 3 and 4, the formats are more consistent than earlier volumes. It should be remembered, too, that the last two Volumes were produced in half the time taken to publish the first two Volumes, and therefore the engravers were more likely to remember and repeat formats. Therefore, with as little deviation from the original as possible, the legend information for Plates 1–15 is reproduced beginning on page 56 with spelling and punctuation intact.

N^o 1.
Drawn from nature by J.J. Audubon F,R,S. F,L,S.

PLATE (I)
Engraved by W.H. Lizars Edin^r
Retouched by R. Havell Jun^r

Wild Turkey. MELEAGRUS GALLOPAVO. Linn, *Male.* *American Cane.* *Miegia macrosperma.*

N^o 1.
Drawn from nature by J.J. Audubon F.R.S.E.
London 1829.

PLATE II.
Engraved by W.H. Lizars Edin^r
Retouched by R. Havell Jun^r

Yellow-billed Cuckoo. COCCYSUS AMERICANUS. Bonap. *Male.1. Female.2. Papaw Tree.* *Porcelia triloba.*

N^o 1.
Drawn from nature by J.J. Audubon F,R,S. F,L,S.

PLATE. III.
Engraved, Printed & Coloured, by R. Havell Jun^r

Prothonotary Warbler.
SYLVIA PROTONOTARIUS. Lath,
Male.1. Female.2.
Cane Vine.

N^o 1.
Drawn from nature by J.J. Audubon F,R,S. F,L,S.

PLATE. IV.
Engraved, Printed & Coloured, by R. Havell Jun^r

Purple Finch
FRINGULA PRUPURES. Gmel,
Male.1.2. Female.3.
Red Larch__Larix americana.

N^o 1.
Drawn from nature by J.J. Audubon F,R,S. F,L,S.

PLATE.V.
Engraved, Printed & Coloured, by R. Havell Jun^r

Bonaparte's Flycatcher,
MUSCICAPA BONAPARTH. Aud,
Male.
Great Magnolia__Magnolia grandiflora.

(N^o) 11.
Drawn from nature by J.J. Audubon F,R,S. F,L,S.

PLATE VI.
Engraved by W. H. Lizars() Ret... [trimmed]

Wild Turkey MELEAGRIS GALLOPAVO. (Linn,) *Female and Young* [trimmed]

(N^o) 11.
Drawn from nature by J.J. Audubon, F,R,S. F,L,S.

PLATE VII.
Engraved by W. H. Lizars Edin^r
Retouched by R. Havell Jun^r London 1829.

Purple Grakle or Common Crow Blackbird. QUISCALUS VERICOLOR. Vieill. *Male.1. Female.2. Maize or Indian
Corn. Lea Mays* [all on one line]

N^o 2.
Drawn from nature by J.J. Audubon F,R,S. F,L,S.

PLATE.VIII.
Engraved by W.H. Lizars Edin^r

White throated Sparrow,
FRINGILLA PENNSYLVANICA. Lath,
Male.1. Female.2.
Dog-wood. Cornus florida.

N^o 2.
Drawn from nature by J.J. Audubon, F,R,S. F,L,S.

PLATE. IX.
Engraved, Printed & Coloured, by R. Havell Jun^r

Selby's Flycatcher.
MUSCICAPA SELBII. Aud,
Male.
Flos-Adonis. Adonis autumnali's.

N^o 2.
Drawn from nature by J.J. Audubon, F,R,S. F,L,S.

PLATE. X.
Engraved, Printed, & Coloured, by R. Havell. Jun^r

Brown Titlark.
ANTHUS SPINOLETTA. Bonap,
1. Male 2. Female.

N^o 3.
Drawn from nature by J.J. Audubon F,R,S. F,L,S.

PLATE. XI.
Engraved Printed & Coloured by R. Havell.

Bird of Washington FALCO WASHINGTONII. Aud, *Male.*

N^o 3.
Drawn from nature by J.J. Audubon, F,R,S. F,L,S.

PLATE. IX.
Engraved, Printed, & Coloured, by R. Havell.

Baltimore Oriole. ICTERUS BALTIMORE. Daud, *Adult Male, 1. Male two years old, 2. Female, 3. Tulip Tree Liriodendron
tuliupifera* [all on one line]

N^o 3.
Drawn from nature by J.J. Audubon. F,R,S. F,L,S.

PLATE XIII.
Engraved, Printed, & Coloured, by R. Havell.

Snow Bird.
FRINGILLA HYEMALIS. Linn,
Male.1. Female.2.
Large Tupelo. Nyssa tomentosa.

N^o 3.
Drawn from nature by J.J. Audubon F,R,S. F,L,S.

PLATE. XIV.
Engraved, Printed, & Coloured, by R. Havell.

Prairie Warbler.
SYLVIA DISCOLOR. Vieill,
Male.1. Female.2.
Buffalo Grass.

N^o 3.
Drawn from nature by J.J. Audubon F,R,S. F,L,S.

PLATE. XV.
Engraved, Printed, & Coloured, by R. Havell.

Blue Yellow-backed Warbler.
SYLVIA AMERICANA. Lath
Male.1. Female.2.
Louisiana Flag. Iris cuprea.

The title page from Volume 1 is given below to give an idea of the information found on each title page. There are a few variations, however, and they are as follows:

Vol. 1	Vol. II	Vol. III	Vol. IIII
1827 to 30.	1831. — 34.	1834. — 35.	1835 to 38
			June 20.

THE
BIRDS OF AMERICA.,
from
ORIGINAL DRAWINGS
By
JOHN JAMES AUDUBON,

Fellow of the Royal Societies of London & Edinburgh and of the
Linnaean & Zoological Societies of London
Member of the Natural History Society of Paris, of the Lyceum of New York,
of the Philosophical Society and the Academy of Natural Sciences
of Philadelphia,
of the Natural History Society of Boston of Charleston,
&c. &c. &c.

LONDON.
Published by the Author.

Vol. I
1827 to 30.

APPENDIX C PLATE MARKS

The average trimmed sheet size is 38.5 x 25.75 inches for Volumes 1 through 3, with Volume 4 slightly larger at 38.5 x 26 inches. The size of the untrimmed double-elephant paper is quoted most commonly as 39.5 x 26.5 inches. However, Thomas Balston gives the size as 40 x 26.75 inches.¹⁰⁵ It is quite possible that Balston was referring to the inside measurements of the deckle on the double-elephant moulds; paper made primarily of linen rags (as well as well- or over-beaten fiber) has a tendency to shrink upon drying, sometimes appreciably.

The deckle or fence-like upper part of the papermaker's mould prevents the paper pulp from running off the mould cover back into the vat. The inside dimensions of the deckle determine the paper size, and it helps to help keep the paper an even thickness. When the deckle is removed, the edges of the sheet are pulled out slightly, leaving a slightly uneven edge. This uneven edge seems not to have caused problems for the letterpress printer using the common press, due to the ubiquitous presence of untrimmed deckle edges seen in books printed prior to the nineteenth century. In the 1800s, however, the new automated cylinder, bed-and-platen, and job printing presses used grippers to feed paper, and deckle edges of handmade paper would have caused alignment problems. (For the vast majority of books printed from the 1840s until the 1880s in the United States was printed on machine-made paper, reels of which were trimmed and cut into sheets before leaving the papermill.) Because the etching press does not employ grippers, deckle edges would not have presented any alignment problems. Nevertheless, only a few sheets with deckle edges or remnants of them were found in the Syracuse set.

The necessity of using the double-elephant size paper was determined by the size of the largest bird that Audubon painted. In some cases, the bird had to be positioned so that it would fit inside the dimensions. This was usually accomplished by depicting tall birds with their heads to the ground, or their necks formed into sidelong "S" shapes.

What is a plate mark? Once the copper plate is inked up, it is laid on the press bed of a rolling cylinder, or etching, press. The damp paper is positioned carefully on top of it, and soft blankets on top of the paper. All are run through the press. During printing, the softened paper is forced down onto the plate and into the lines to pick up the ink. Under pressure, the paper at the edges of the plate deform thus producing the so-called plate mark. Prior to printing, the edges of the copper plates are beveled with files toward the top surface so that the paper is not broken or cut during printing. The paper within the plate mark is compressed and smoothed to

¹⁰⁵ Balston, *William Balston*, 158.

the extent that even without distinguishable plate mark lines, it is usually possible to identify the area that was in contact with the plate surface. This compaction makes the paper within the plate mark thinner than the paper outside it. For example, using a micrometer, the following measurements were taken from two large Plates:

	Inside plate mark	Outside Plate mark
Plate 336	.009 inch	.010 inch
Plate 376	.0109 inch	.011 inch

This would seem to be a very small difference, but it is one that can be easily felt.

Since the paper within the plate mark is stretched while under pressure, that area usually exhibits some distortion or cockling. It was common practice to flatten prints once they had dried. It seems that Havell's method was to hot press them, i.e., the prints were humidified (either before or after coloring; it is not clear which) and placed between two heated, smooth sheets of metal. This sandwich was then run through a rolling press. Audubon did comment on the occasionally disastrous effects of this procedure:

Mr. Charnley's [a prominent Northumberland bookseller] head clerk said that one of the plates of N^o 18 was nearly cut in two in the hot pressing and that it must have past your attention.¹⁰⁶

...however as you have been disappointed yourselves with the hot press man, we must content ourselves the best way we can.¹⁰⁷

In the following list, the dimensions of the outside edges of the plate marks are given in inches and in the conventional manner of height x width. All of the Plates were bound the right way up, but in a few cases, Plates with a horizontal format were bound with the image facing the gutter instead of the fore-edge. The sizes for each type of Plate (large, medium and small) are given from the smallest to the largest.

Size of plate marks

Plates

Large Plates:

25.5 x 37.75	401
25.5 x 38	231, 396
25.5+ x 38	191, 266, 286 (trimmed)
25.5+ x 38.25	301, 321, 326, 371 (trimmed)
25.5+ x 38+	16, 31, 71, 76, 106, 341, 346, 361, 386, 391, 421 (trimmed)
33.25 x 23.75	21
33.5 x 23.75	26
37.5 x 25.75+	131, 146 (trimmed)
37.75 x 25.75+	86, 116, 271, 416 (trimmed)

¹⁰⁶ Audubon, *Letters*, 1:118. Letter to Havell, dated 30 September 1830.

¹⁰⁷ *Ibid.*, 1:134. Letter to Havell, dated 10 April 1831.

38 x 24.75	186
38 x 25.75+	1, 46, 91, 121, 136, 141, 196, 216, 236, 251, 256, 316, 426 (trimmed) 206, 226 (trimmed)
38.25 x 25.5+	6, 11, 36, 41, 51, 56, 61, 66, 81, 96, 101, 111, 126, 151, 156, 161, 166,
38+ x 25.5+	171, 176, 181, 201, 211, 221, 241, 246, 261, 276, 281, 291, 296, 306, 311, 331, 336, 351, 356, 366, 376, 381, 406, 411, 431 (trimmed)

Medium Plates:

18.75 x 26.25	32
18.75 x 28	402
19.75 x 26.5	252
20.5 x 26	217, 272
20.5 x 27.5	72
20.75 x 25.75	237
20.75 x 26	167, 172, 222, 227, 232, 282, 322
20.75 x 30.25	247, 262, 287, 297
20.75 x 30.5	292
21 x 26	212
21 x 28.5	202
21 x 30.25	327
21 x 33	377
21.25 x 30.25	317
21.25 x 30.5	302, 307, 312, 332, 342
21.5 x 25.75	387
21.5 x 26	392
21.5 x 29	397
21.5 x 29.25	382
21.75 x 26	432
21.75 x 27.5	427
22.75 x 28.5	407
23 x 28	337
23.5 x 27.5	412
25.25 x 20.5	177
25.5 x 20.25	92
25.5 x 20.5	82, 137, 152, Vol. 3: title page
25.5 x 21.75	27
25.75 x 20.5	57, 97, 142, 147, 157, 187, 192, 197, 207
25.75 x 20.75	42, 242
25.75 x 21.5	357
26 x 20.5	52, Vol. 2: title page, 102, 107, Vol. 4: title page
26 x 20.75	Vol. 1: title page, 12, 22, 37, 47, 62, 67, 77, 87, 112, 117, 122, 127, 132, 162, 182
26 x 21.75	277
26.25 x 21.75	362
26.5 x 20.625	7
26.5 x 21	2
26.5 x 22	347
27 x 20.75	17
27.25 x 23.5	372
28.5 x 25.5+	422 (trimmed)
29.5 x 21.75	367

30 x 21.75	267
30.25 x 21	352
30.25 x 22.75	417
30.5 x 21.75	257

Small Plates:

12.25 x 19.5	80, 83, 99, 108, 208, 209, 210, 213, 214, 215, 218, 220, 223, 224, 225, 228, 229, 230, 233, 235, 239, 243, 244, 260, 263, 264, 265, 270, 275, 278, 279, 283, 284, 285, 289, 290, 294, 295, 299, 305, 315, 329, 330, 335, 340, 349, 350, 403, 404, 405, 413, 430
12.375 x 19.75	339
12.5 x 20	344
12.5 x 19.75	370
12.75 x 21.5	423, 429
13 x 19.5	203
13 x 20.5	10
13.25 x 21	238
13.75 x 17.5	234
14.5 x 19.5	249
14.75 x 20.5	205, 258, 259, 267, 268, 269, 273, 274, 288, 293, 298, 300, 313, 314, 318, 320, 325, 328
14.75 x 21	303, 304, 308, 310
15 x 20	345
15.25 x 21	334
15.25 x 24.75	409
15.75 x 22.5	255
16 x 21.5	254
16 x 21.75	253
16 x 26.5	343
16.25 x 21.5	368
16.5 x 22	408
16.75 x 23	418
16.75 x 24.75	348
17.5 x 20.5	219
18.5 x 13.75	184
18.5 x 23.75	338
18.75 x 16	428
19 x 15.5	385
19.25 x 12	149, 389, 393
19.5 x 12	129, 139
19.5 x 12.25	13, 14, 15, 18, 20, 23, 24, 25, 28, 29, 30, 33, 34, 35, 38, 39, 40, 43, 44, 45, 48, 49, 50, 53, 54, 55, 58, 59, 60, 63, 64, 65, 68, 69, 70, 73, 74, 75, 78, 79, 84, 85, 88, 89, 90, 93, 94, 95, 98, 100, 103, 104, 105, 109, 110, 113, 114, 115, 123, 124, 128, 130, 133, 134, 135, 138, 140, 143, 144, 145, 148, 150, 153, 154, 155, 158, 159, 160, 163, 164, 165, 168, 169, 170, 173, 174, 175, 178, 179, 180, 183, 188, 189, 190, 193, 194, 195, 199, 200, 240, 250, 280, 319, 354, 355, 363, 364, 365, 373, 375, 383, 384, 388, 390, 394, 395, 398, 399, 400, 414, 415, 419, 420, 425, 434, 435
19.5 x 14.75	374
19.5 x 15	204

19.5 x 15.25	309
19.5 x 15.75	410
19.75 x 12.375	19, 118, 119, 120, 125, 198, 360, 379
19.75 x 14.25	353, 369
20.25 x 13.5	424
20.5 x 12.5	3, 4, 5
20.5 x 13	8, 9
20.5 x 14.25	433
20.5 x 14.75	185, 358
20.5 x 15.75	380
20.5 x 22.25	333
21 x 17	324
21 x 21	323
21.75 x 14	359
22.5 x 14.75	248
26.25 x 22	378

APPENDIX D

CONDITION SURVEY FORM

The survey was carried out in the George Arents Research Library. An angle-poise lamp was positioned so that the Plates could be examined in transmitted light, which is essential for determining the countermarks and some types of damage. This system was usually adequate, but in some cases, a stronger source of transmitted light (a flashlight) was required to identify the countermarks of some of the title pages that were backed with a second piece of paper, and the heavily inked and colored Plates.

The goal of the survey was to identify the condition of each Plate. In order to make the survey as useful as possible to both conservation professionals and laypersons, the author designed a specific condition survey form. However, once the survey began, it became apparent that the form was not complete, and additional information had to be added each time a new Plate was examined, i.e., plate mark size, Number numbers, and condition of the verso. It was possible to change the format, but 450 copies of the form had already been copied, and the expense of recopying it did not seem justified. All of the completed forms were bound and are in the George Arents Library. They should be used when conservation work is carried out on the Plates. The following is an explanation of the information that can be found on the form, see page 66.

1. Volume, Number and Plate numbers. The Volume numbers were recorded in Roman numerals on the form. Volumes 1, 2 and 3 each contain 100 Plates, as well as a title page and two endpapers. Volume 4 (on title page, "Vol. IIII") contains 135 Plates plus a title page and two endpapers. The Number numbers were recorded in Arabic numerals. The Plate numbers were given in Roman numerals in the space provided. For easy reading, Arabic numerals for the Plates were written in the upper right corner of the form and circled.

2. Title of Plate. In every case, the common name of the bird included in the legend, rather than the scientific name, was used to identify each Plate.

3. Condition Check List. The check list includes the following types of damage one would expect to find on large prints: tears, surface dirt, foxing, abrasion, creases, small holes, folds, losses and a space for "other damage." In addition to these, it was necessary to add another section, the "verso" that described, briefly, the condition of the back of each Plate. If a damage on a Plate corresponded to any of the above categories, the space to the left of the category was checked, and the method of recording the information in the diagram was indicated to the right of the category. For example, tears were indicated with a wavy line, while surface dirt was symbolized by a broader, smudged line. In many instances, specific damages such as stains, spots and sanding or erasure were indicated and described directly in the

diagram. “Foxing” was indicated by a check on the form *only* if it refers to a stain consisting of a small, rust-colored dot surrounded by a lighter brown halo. Other types of small spot stains were described in the diagram. There was very little true “foxing” on the Plates.

4. Watermark. In all instances, the countermarks found on each Plate and the title pages were indicated on the form and located in the diagram.

5. Comments. This space was reserved for additional information not covered under “Condition Check List.” Examples were: evidence of a deckle edge, broken binding, loose sewn section, media damage, etc. Although the condition of the watercolors and the inked lines was generally excellent, a few Plates warranted comments on particular problems or observations relating to these.

6. Diagram and Scale. On each form, an outline of the Plate was drawn, and this was the diagram into which much information concerning the Plate was drawn and written. The binding edge—gutter—was always to the left, and the Plates were described with that orientation no matter how the image was positioned on the paper. In addition to damage, other information found in the diagram were: location of the countermark and the relative size of the plate mark. The scale is indicated just below the diagram: 0.5 cm = 1 inch. This scale is useful for determining the approximate size of the plate mark. The damages indicated in the diagram were not necessarily drawn to scale, although their relationship to the paper edges and the plate marks are fairly accurate. Please note that the location of the plate marks was done sometime after Volume 1 had been surveyed. Therefore, damages located in those diagrams may not necessarily correspond to the location of the plate marks that were drawn in later.

7. Plate mark dimensions. To the right of the scale symbol, the word “Plate” was written. The dimensions following it indicate the size of the plate mark. In all cases, the plate mark was measured from the outer edges of the mark in inches, height x width. When the orientation of the image is not vertical, an arrow indicated the direction the image faces, either toward the fore-edge or, in a few cases, the gutter. When the plate mark was trimmed, “+ trimmed” were used to indicate this.

8. Preparator’s initials and date. “CB” indicates the author, and the date was when a particular Plate was examined. The survey was conducted, intermittently, from the end of February 1985 until the end of July 1985, and it took roughly 100 hours.

Binding Edge

①

⑥

Scale: 0.5 cm = 1 inch ⑥

1" 2" ⑦

John James Audubon's *Birds of America* — Condition Survey and Watermark Information

Volume # ① Plate # ① Title of Plate _____ ②
No. # _____

Condition Check List:

tears surface dirt
 foxing abrasion ③
 creases small holes
 folds losses
 other damage: _____

Watermark: _____ ④

Comments: _____ ⑤

by _____ ⑧ date _____ ⑧

APPENDIX E BINDINGS

Description

The binding of all four volumes was probably done in 1838. This is substantiated, primarily, by the 1838 countermark date of the title page of Volume 1. Most of the other Plates in Volume 1 are dated 1832. The title page for Volume 1 was probably printed close to the completion of Volume 4 in 1838.

Volumes 1, 2 and Volume 3 were bound with the Plates in the correct order. However, in Volume 4, a number of Plates were bound out of order. Plates 342–358 were bound between Plates 332 and 333, and Plate 359 was bound out of order between Plates 341 and 342.

Because the volumes were subsequently pulled, it was easy to determine the binding structure. Plates had been overcast or whipstitched together with a stout linen thread in blocks of seven to ten Plates for a total of eleven or twelve blocks for Volumes 1, 2 and 3. Once the block was sewn, thick cords of jute were run up the sewn edge, perpendicularly, at intervals of approximately 3 inches. To eliminate ridges, which would have caused excessive wear on the spine, channels were sawn into the blocks at the sewn edges so that the cords fit snugly into them.

Once the cords were in place against a block, a heavy linen thread was secured at one end of the block. The thread ran along the top of each block near the sewn edge, and was brought behind each cord until the other end was reached. This type of sewing is called “ordinary” sewing. Ordinary sewing, as opposed to “flexible” sewing, is inexpensive because it saves time. Unfortunately, ordinary sewing is a much weaker binding structure because the cords are not actually attached to the blocks but are merely held in place by the thread running along the top of each block. Other disadvantages of ordinary sewing are: when the book was open, the cords and sawn grooves could be seen in the gutter; and the brown, brittle glue used to consolidate the back and secure the spine material usually seeped into these grooves, which stiffened the back/spine and further reduced the flexibility of the book.¹⁰⁸

Once the Plates were bound, the back was covered with thick, brown, linen rag paper that was a hollow tube. One side of the tube was glued to the blocks while the other side was covered with leather. This is called a hollow-back binding and is commonly used in conjunction with the ordinary sewing technique.

Before the hollow back paper was covered with leather, seven false bands about 1.5 inches wide were glued to the paper at regular intervals. The bands are made of several plies of

¹⁰⁸ R. R. Donnelley & Sons Co., *A Rod for the Back of the Binder* (Chicago: The Lakeside Press, 1928), 11–18.

thick, gray paper. This structure constituted the spine.

After the spine was made, the cord ends were glued to the top of the thick, millboard covers. The boards and spine were covered with leather. This leather covers approximately one quarter of the boards. The corners at the fore-edge were covered with the same leather, and the sides were covered with marbled papers.

This type of binding is called half (or three-quarter) bound, and it signifies the proportion of the area of the boards covered by leather. The leather appears to be Russia calf. It was a popular binding leather, usually red or reddish brown, and smooth grained. Unfortunately, it does not wear well, often dries out, cracks and flakes.¹⁰⁹

Rebinding

During the disbinding, it became evident that several components of the binding were replacements. At the edges of the boards where the uppermost layer of pieced marbled paper had split, remnants of a previous layer of marbled paper could be seen. The pastedowns—paper adhered to the inside covers—are plain, white sheets in good condition, and the so-called “made” endpapers are two thin, wove papers adhered together. Neither the pastedowns or the endpapers are sewn to the blocks but instead are each attached to a strip of purple cloth. This hinge is attached to the inside cover under the pastedown; to the edge of the blocks; and finally, to the verso of endpaper and the recto of the title page. At the back of the volumes, this procedure is followed in reverse with the cloth attached to the verso of the last Plate and the recto of the back endpaper. This type of binding using a cloth hinge is called the library-style endpaper, and it was commonly used in the nineteenth century for large books.¹¹⁰

There are two reasons to suspect that the pastedowns and endpapers are replacements. First, the title pages and some of the first Plates in each volume have undergone some restoration. This restoration consists of some local patching, and secondary backings on the title pages of Volumes 2 and 3. For easier access to the binding, it is very likely that the title pages and last Plates were removed, along with the original endpapers. Fries mentions that the endpaper or flyleaf in another set was “not Whatman paper.”¹¹¹ The Syracuse endpapers and pastedowns are thin, white, wove papers with no countermarks. Also, the front endpaper in Volume 1 tested positive for rosin while no rosin was found in any of the other samples from the Plates. The endpapers are probably machine-made, alum-rosin-sized papers. The reason for removing the original pastedowns was probably because the original cloth hinge was weak or

¹⁰⁹ Ibid., 23–24. See also Plate XI.

¹¹⁰ Matt Roberts and Don Etherington, *Bookbinding and the Conservation of Books. A Dictionary of Descriptive Terminology* (Washington, D. C.: Library of Congress, 1982), 158.

¹¹¹ Fries, *Double Elephant Folio*, 124.

torn and had to be replaced.

Secondly, there are no inscriptions by Haller Nutt in any of the folio volumes. It seems strange that Nutt would write his name in the five volumes of the *Ornithological Biography* and not inscribe the folio volumes. In each of the *Biography* volumes, there is a library bookplate with this information, handwritten in black ink: Given by Hon. James J. Belden, 10 F 1897. All other sources give the date of the Belden gift as the fall of 1896. In the *Biography* volumes, there is also another, more recent bookplate with Belden's name typed on it. This newer bookplate is also glued onto the inside cover of the folio volumes, but the older one is not. It appears that the original, incorrect bookplates were removed with the original pastedowns and not replaced.

Before the replacement pastedowns were added, another layer of marbled papers was glued to the outside of the cover and turned over to the inside. The new pastedowns were then glued on.

It is likely that this restoration work (including the sanding of the Plates?) was done sometime after 1934. In her article on *The Birds of America*, Benedict wrote,

The "Birds of America" in the possession of the Syracuse University is in its original heavy Russia leather binding and is in excellent condition, even the "Wild Turkey" (the first plate issued and number one in the bound set) which Winterich in his book "Books and the Ban [*sic*]," 1929, calls the "Key to a perfect copy of the book."¹¹²

The "Wild Turkey" Plate is no longer in "excellent condition" and has been extensively repaired. This work must have been done some time ago, as staining from the leather, marbled papers, and some Plate offset has occurred on the replacement pastedowns and endpapers.

Condition of bindings; disbinding the Volumes

The differences in the degree of deterioration of the bindings of Volumes 2 through 4 can almost certainly be attributed to the disproportionate amount of handling that each has received.

Volume 1 was probably handled and perused more than Volume 2, and so on. Consequently, Volume 4 is in relatively good condition. Nevertheless, the decision was made to disbind all four volumes.

Volume 1 was in the poorest condition. The spine was not attached to the sewn blocks at all, and most of it was missing. The covers were also free, and the binding was, therefore, affording very little support to the Plates. (The weight of one volume is between 40 and 50 pounds.) Many of the blocks of Plates had come loose. The thread was broken in places, and the cords were partially detached, having come loose when the covers came off. For example, Plates 1-7 formed one block, and it was completely separate from the rest of the blocks. Other blocks,

¹¹² Benedict, "Birds of America," 26.

for example, Plates 8–25, were tenuously attached and in danger of further damage. Plate 26, “Carolina Parrot,” was almost free and in obvious danger.

Volume 2 was in poor condition with regard to the binding, but it had fared better than Volume 1. On the front, the hollow and the leather of the spine had split along its entire length, and the cover was detached. The spine was not adhered to the sewn blocks but was still attached to the back cover. The first block, consisting of Plates 101–107, was loose, as was the block of Plates 116–124.

Volumes 3 and 4 were worn at the spines and covers, but the bindings were intact and presented no immediate danger to the Plates. However, Plate 201, “Canada Goose,” was severely damaged, and these two volumes are also pulled to protect all of the Plates.

The techniques used to pull the volumes were traditional and straightforward. Because the sewn blocks in Volume 1 were free of most of the spine, its disbinding proceeded more rapidly than the others. Generally, the spine was removed by cutting along the hollow back leaving some paper on the inside of the spine and some on the sewn blocks. The paper on the blocks was then removed by pulling it off, sanding or scraping it to expose the glue.

When as much of the glue had been revealed as possible, a poultice of a water-based adhesive was applied to soften it; it was then scraped and wiped off. Traditionally a starch paste or glue is used for this softening process, but for these volumes, a viscous, 2.5% solution of a high-viscosity-grade methylcellulose (Methocel A 4M, Dow Chemical) in water was used. Methylcellulose is a very stable material and is ideal for use as a poultice. It slowly releases water to soften the glue but does not spread out of control. Many applications of the methylcellulose poultice were required before the sewn edges of the blocks were free of glue and flexible enough to begin separation of the Plates.

First, the threads that were wrapped around the cords were cut, and the cords were pulled out of the channels. Second, the overcast threads that held the Plates together in each block were cut and removed. To free each Plate from the one below it, a bone folder (a blunt, round-edged tool shaped like a knife with a point end) was inserted under the top Plate at the binding edge and moved from one end to the other to free each Plate. If the binding edge was kept slightly moist and flexible, the bone folder could pry the Plates apart without further damage.

During the disbinding, previous damage caused by the inflexibility of the binding and the brittle glue became more apparent. Not surprisingly, numerous small losses and tears along the sewn edge were found. Some glue residues remain on the very edges of most of the Plates; the edges of Plates at the beginning and end of the volumes do not lie flat. The space and equipment needed to remove the glue and flatten the edges were not available where the volumes were pulled. Unfortunately, two Plates, 82 and 92, were accidentally torn at the

binding edge, during disbinding. It is recommended that they and the edges of the rest of the Plates be repaired as soon as possible.

The Plates are now in Mylar folders so that each can be examined and handled without touching the paper, yet each can easily be removed for exhibition or closer examination. The folder also provides support for the paper, and further damage should be reduced. An added advantage of the disbinding is the physical separation of the Plates from each other. Much of the visible damage suffered by the Plates has been the offset staining transferred from the acidic ink oil on preceding or succeeding Plates. Storage in folders should eliminate this problem. The covers and spines were labeled and stored with the Plates.

APPENDIX F
UNIVERSITY OF MICHIGAN LIBRARY COPY

Provenance

When the University of Michigan was established in 1817 in Detroit, it was one of the first public universities in the country; Michigan was not admitted to the Union until 1837. That same year, the University moved to its present home in Ann Arbor, a booming town established in 1824. At the time of the move, the Board of Regents outnumbered the combined faculty (2) and students (7) by 10 members, and it was this board that was responsible for the University's first purchase for the non-existent library, Audubon's *The Birds of America*.

When the Board met on 5 February 1838, Regent Dr. Zina Pitcher moved, and it was resolved that "the Secretary be authorized to subscribe for one copy of Audubon's Ornithology for the use of the University."¹¹³ Slightly more than a year later on 1 March 1839, Pitcher informed the Board that "a communication from William A. Colman of the City of New York advising the Board that Audubon's Ornithology was ready for delivery, and enclosing a bill for the same."¹¹⁴ At that point in time, the published work comprised the four half-bound, double-elephant plate volumes and the four of five volumes of the *Ornithological Biography*; vol. 5 was published later in 1839. On 26 April 1839, a check was forwarded to Colman for \$970.

Colman's role in this purchase and another one for the State of Michigan is confusing. In the fourth volume of the *O.B.* published by November 1838, the State is listed for the first time as a subscriber to *The Birds of America*. Audubon wrote to Havell on 30 January 1839 that this half-bound copy was to have locks on it. More than a year later, Audubon noted in his journal, dated 9 & 10 July 1840:

W. A. Colman To
J. J. Audubon & Son, Locks on Copy of "Birds of America" for State of
Michigan on 29 May 1839.
\$20 & Box for ditto \$23
Per. M. Berthoud a/c¹¹⁵

Through this entry, however, a line was drawn with "Null" written in the left margin. The State of Michigan subscription was ordered by Governor Stevens T. Mason, who was also a regent of the University. Surprisingly, the State's purchase was still in the works almost a year after the UM purchase was complete, but it was eventually canceled, presumably because the State already "owned" a copy that resided at its University.

¹¹³ Russell E. Bidlack, "The University of Michigan General Library: A History of Its Beginnings, 1837-1852" (Ph.D. diss., University of Michigan, 1954), 83.

¹¹⁴ *Ibid.*, 96.

¹¹⁵ Fries, *Double Elephant Folio*, 316.

It appears that Colman was acting as agent for both the State and University copies, and he corresponded with Audubon a couple of times in 1838 and 1839. On 23 April 1838, he wrote Audubon asking about some duplicate and correspondingly missing plates. Audubon's reply from London a month later on 25 May was:

I have shown your letter to M^r Havell My Engraver, and mentioned your anxiety to have Nine Plates forwarded to you for the Purpose of Substituting them to an equal Number in your Set purchased at Baltimore, but not purchased from us. We find that five of the plates you want are not only the largest figs, but some extremely full and difficult to Colour, and he says that our Printers and our Colourers would not undertake to go throu them without charging a most extravagant price. I have no extra plates Whatever on hand, and in consequence of this must be obliged to decline furnishing you with them.

If at the conclusion of my publication I find any of the plates you want they will be sent to you forthwith, but I wish you not to calculate upon this until you hear again from me, or from My Sons on this Subject.

My work will be entirely finished by the end of Next Month {actually 20 June}, our Engraving and printing establishment will then be broken up, and few will indeed there be [sic] Copies to be had by any one, who has not Subscribed to the "Birds of America"!

Should you see any of my American Subscribers who have not as yet received any portion of the Work, please to assure them that as soon as the fourth Volume is quite finished, and *bound* according to their desires, their copies will be forwarded at once to their respective houses, or to whomever they have directed me to send their copies.

I Hope that you and the rest of the American Merchants will feel relieved from the problem now felt through out the Union {a financial panic}, and I remain My Dear Sir very respectfully

Your ob^t Servant
John J. Audubon¹¹⁶

According to Fries, Colman subscribed under his own name to the work and his name appears in Audubon's Ledger "B" where subscriber information (in single quotation marks below) was kept.

'Coleman [sic], W. A. New York
February 12, 1836—No. 50
July 1836 " 87
50–87 inclusive.' An "X" indicates the subscription was not completed.
Additional entries in Ledge "B":
'W. A. Coleman
1836—Feb. 1—No. 51 18–18-0 [18 guineas]
1837—J. E. Walker 21–18-0
July 1838—[Nos.] 82–87 12–12-0'¹¹⁷

"J. E. Walker" is probably "Joseph E. Walker, Baltimore Museum," who, according to the

¹¹⁶ Quoted in Bidlack, *University of Michigan Library*, 96–97. My brackets are { }.

¹¹⁷ Fries, *Double Elephant Folio*, 154.

Ledger “B” entry, was sent unidentified Plates in 1837 and according to other sources, received vol. 2 of the *O.B.* that was published in 1834.¹¹⁸ Since the *O.B.* was only sent to paid-up subscribers, we might assume that Walker had received Plates by or earlier than 1834. According to Fries, Walker (or the Museum?) seems to have canceled the subscription.

In July 1838, Colman received the last 30 Plates at the end of the publication, and Fries concluded that the bookdealer probably combined Walker’s and his Plates to make up the copy that the University now owns. However, the watermarks of the first few Plates in Volume 1.1 of the University’s set contradict this.

Title page	J WHATMAN TURKEY MILL 183_
Plate I Turkey	J WHATMAN 1838?
Plate II Cuckoo	could not be determined
Plate III Warbler	J WHATMAN 1831
Plate IV Finch	J WHATMAN 1838?
Plate V Warbler	could not be determined
Plate VI Turkey	J WHATMAN 1838
Plate XII Oriole	J WHATMAN TURKEY MILL 1838

If the early Plates indeed came from Walker’s set, sent to him by or before 1834, then the 1838 watermarked Plates could not be from his set. Colman obviously purchased an incomplete set of Plates from someone in Baltimore, presumably Walker, but the low-numbered Plates would have had pre-1838 watermarks. The watermarks listed above only mean that the low-numbered Plates in the University’s volume were printed and colored in 1838, interspersed with a few surplus Plates made much earlier. This information seems to fit a new scenario: in late 1838 or early 1839, Colman purchased *The Birds of America* from an unknown source, perhaps from Audubon or Havell, which was he then sold to the University of Michigan in March 1839. It is possible that the University’s set was actually the one Colman was compiling for the State of Michigan (without locks), which was subscribed for by late 1838 and which was canceled sometime after July 1840.

In Fries there is the following:

Item 2115, p. 106 [from an 1850 auction catalogue]: “Audubon’s Great Work, The Birds of America. 4 vols., imperial folio, contains 435 plates with five volumes of letter press [*O.B.*], half bound. A Subscriber’s Copy.”¹¹⁹

It could very well be that this auctioned copy was made up of the combined Plates belonging to the aforementioned “Baltimore” set and Colman, and in fact, that set may not have been

¹¹⁸ Ibid., 78, 450.

¹¹⁹ Ibid., 154.

complete, having some duplicated and missing Plates referred to in Audubon's letter to Colman of 25 May 1838.

Description

At this writing (March 2009), I have not had the opportunity to survey the University's complete set of Plates, except for a brief examination of the low-numbered Plates. The work is now bound in eight volumes rather than the original four, described by Bidlack as "half bound in red calf."¹²⁰ The rebinding was performed in 1933–1934 either by or under the supervision of William C. Hollands, who was in charge of the University's Printing and Binding department.¹²¹ At that time, the four volumes were completely disbound and split into eight volumes, 1.1, 1.2, 2.1, 2.2, 3.1, 3.2, 4.1, and 4.2. The University's set is made of Volumes 1.1 through 3.2, each containing 50 Plates. Volume 4.1 contains Plates CCCI (301) through CCCLXII (362), while 4.2 comprises Plates CCCLXIII (363) through CCCCXXXV (435). According to Fries, the present eight-volume binding in London's Victoria & Albert Museum was done around 1950, which means that the University's binding antedates it by 15 years. Perhaps the University's binding provided the pattern for the V&A's set. The V&A volumes follow the same arrangement and vol.part numbering as the University's, except that the V&A's 4.1 ends with Plate CCCCLXV (365) and 4.2 begins with Plate CCCCLXVI (366).¹²²

When the Plates were separated from their whip-stitched block/sunken-cord sewing structure, the gutter edge—caked with brown, brittle, animal glue—was either trimmed individually or perhaps the back of the binding was guillotined. In any case, the clean edge—the whip-stitch holes and sunken grooves can still be seen—was then attached to a strip of cloth, which has a yellow stripe woven into the cloth indicating that it might have been ticking. Leaving a gap of about a quarter inch, the other edge of the cloth was then attached to a heavy strip of paper, called a guard. James Craven, book conservator at the University's Bentley Historical Library, whose father George was employed in the Bindery during the rebinding,

¹²⁰ Ibid., 100. Bidlack notes that Francis L. D. Goodrich and Ella M. Hymans recalled "rather vividly the original binding."

¹²¹ William Charles Hollands (British-trained bookbinder?, 1862–19??) appears to have been nationally known. He lectured and published a few articles about the subject and also authored an unpublished translation of Alfred Bonnardot's *Essai sur l'Art de Restaurer les Estampes et les Livres*, 2nd ed., Paris: 1858, a copy of which is in the University of Michigan Library. In a brief history of the library, <http://www.lib.umich.edu/grad/showcase/history/History.pdf>, it is noted that in 1896, "The Library established its own bindery and WC Hollands, University binder, rebound the Library's first purchase, Audubon's *Birds of America*." The last statement probably refers to the subsequent rebinding done/supervised by Hollands in 1933–1934. According to Jim Craven, Hollands retired from university service in the late 1940s.

¹²² Fries, *Double Elephant Folio*, 342.

briefly examined Volume 1.1 and thought that the guards were sewn through the fold (after nesting in sections?), rather than whip-stitched together. This flexible cloth hinge allows greater ease in turning the pages, but the grain direction of the paper still runs perpendicular to the gutter, and this remains the primary problem. It is still difficult for the Plates to lie flat when the book is opened flat, and therefore the book should always be supported on book cradles, allowing an opening not greater than 100°.

The present binding is half leather (a thick, brown leather, possibly cowhide) with cream-colored, stout cloth sides over heavy boards. The binding does not appear to have a “spring-back” spine lining (a rigid paper tube inserted between the back of the book and the spine), as might be expected for a book of this size and weight. However, a spring-back binding would have necessarily “thrown” the book flat when opened, and Hollands probably realized that this book should never be opened flat.

The endpapers are new, and the title page for vol. 1.1 is badly damaged and was lined with a Western paper, probably at the time of rebinding. Other repairs were made, but at some point after the rebinding, it seems that someone further repaired the pages with unnecessarily long and large strips of cloth and an adhesive, probably starch, as well as with a commercial gummed cloth tape.

Besides a multitude of edge tears, the first Plates in the first volume are very dirty from handling, especially in the upper and lower fore-edge corners. Andrew Ten Brock, author of a history of state universities, stated in 1875: “It is now thirty-five years that the leaves of these ponderous volumes have been turned over by students and visitors, excepting only a few years during which they were laid aside in the hope that by avoiding wear they might be transmitted as the property of the library to distant ages.”¹²³ William W. Bishop was a University librarian from 1915 to 1941, and he recalled that, when he was a new student at the University in 1889, the volumes were “exposed to inspection and handling by every visitor to the art gallery in the library.”¹²⁴ Presumably the art gallery was located in the wooden General Library building, replaced in 1920 with the presently named Harlan Hatcher Graduate Library (Hatcher North). Bidlack further notes that slightly before 1915, the Rare Book Room was created, and the Audubon was moved into it.

Today, in the exhibition area of the Special Collections Library on the 7th Floor of Hatcher South, one Plate of Audubon’s *The Birds of America* is displayed in a specially designed case. If a new Plate was displayed every week, it would take almost 8 and a half years to see the entire work. Within a few months, a new exhibition area will be built in Gallery Room 100 of

¹²³ Quoted in Bidlack, *University of Michigan Library*, 101.

¹²⁴ Quoted in *ibid.*

Hatcher North, where it is proposed that the Audubon be exhibited in a new case.

I recommend disbinding the book, housing the individual Plates in Melinex folders, and storing them in a map case. I would conduct an extensive condition survey of each Plate, similar to that performed on the Syracuse University set. Then special frames would be constructed to display many Plates at once, giving the viewer a better idea of the magnitude of Audubon's *The Birds of America*.

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