Historical Comets Over Bavaria: The *Nuremberg Chronicle* and Broadsides

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ABSTRACT. The first widely distributed printed comet images appear in the *Nuremberg Chronicle*, whose Latin edition appeared in 1493, followed closely by a German edition. In the first section, we begin our consideration with the comet image that has frequently been cited as a representation of the A.D. 684 apparition of Comet P/Halley. To better understand this image, we present a thorough survey of the 13 comet images that appear in the *Chronicle*, all reproduced from four woodblocks, representing 14 apparitions between A.D. 471 and A.D. 1472. In the second part, we present an analysis of the unpublished preparatory drawings for the comet images in the handwritten Exemplars (manuscript layout dummies) for both the Latin and German editions in the Stadtbibliothek, Nuremberg. Finally, in the third part, we demonstrate how the *Chronicle* presaged the proliferation of broadsides--woodcut prints that functioned like tabloids of the sixteenth and seventeenth centuries. We examine broadsides recording historical comets over such Bavarian cities as Nuremberg and Augsburg. In spite of their superstitious, hysterical journalism, fed by turbulent political and religious upheavals, these broadsides reveal a nascent scientific attitude.

1. The Comet Illustrations of the *Nuremberg Chronicle*

During the recent passage of Halley's Comet (Fig. 1), one often saw reproduced a comet illustration described as the A.D. 684 passage of Halley's Comet and the first known representation of Comet P/Halley (Fig. 10). This woodcut print is from the *Nuremberg Chronicle,* published in 1493 in Nuremberg (Fig. 2). The book is a chronicle, a succinct record of noteworthy events and phenomena, both natural and cultural, arranged in a roughly chronological order, which, unlike a history, provides little commentary or interpretation. It covers a period stretching back six millennia and is one of the best known early printed books.

Moreover, the *Nuremberg Chronicle* has a large format and is lavishly illustrated with 1809 illustrations printed from 645 actual woodblocks. Although there had been other printed chronicles, some of which were used for source material by Schedel for the *Nuremberg Chronicle*, they were not as copiously illustrated.[1] The volume's official name was "The Book of Chronicles, with pictures and portraits from the beginning of the World."[2] The production of the book, commissioned by two wealthy citizens of Nuremberg--Sebald Schreyer and Sebastian Kamermaister--was really a civic enterprise.[3] The artists Michael Wolgemut (to whom Albrecht Dürer was at one time apprenticed) and Wilhelm Pleydenwurff were responsible for supervising the production of its illustrations. After the signing of the contract, Hartmann Schedel--a Nuremberg humanist, bibliophile, and physician--was selected to write the text, suggesting that the illustrations took precedence over the text.[4]

R. L. Newburn, Jr. et al. (eds.), Comets in the Post-Halley Era, Vol. 2, 1309–1341.

Fig. 1 Comet P/Halley 1986. Akira Fujii.

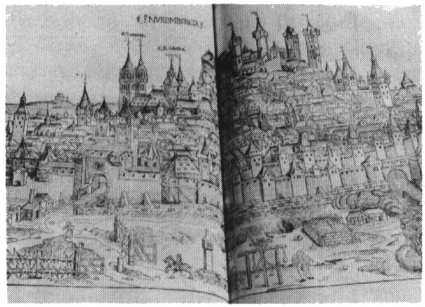

Fig. 2 View of Nuremberg, folios XCIXv and Cr, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. (Klopfer copy). The Chapin Library of Rare Books, Williams College, Williamstown, MA.

Fig. 3 Bernhard Walther's and Albrecht Dürer's house with observing aperture, Nuremberg.

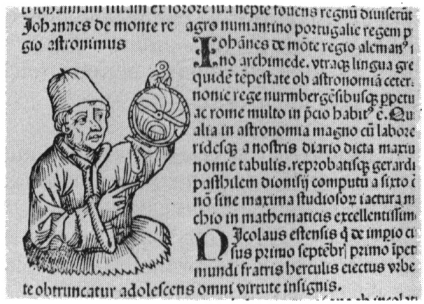

Fig. 4 Portrait of Regiomontanus, folio CCLVr, from Hartmann Schedel, *Nuremberg Chronicle*, 1493.

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In the later fifteenth century, Nuremberg was already a center of astronomy. Regiomontanus had come there in 1471 for four years, and his pupil, Bernhard Walther, built an observing aperture onto his own house (Fig. 3), which he later sold to the artist Albrecht Dürer. The remains of Walther's observatory are still visible on the upper gable of the Dürer house. From this very aperture, Regiomontanus and Walther observed the comet of 1472 (not, as often claimed, Comet P/Halley, which had passed in 1456). Thanks to the fame of Regiomontanus, who observed in Nuremberg up to 1475 when the Pope called him to Rome (where he died), Nuremberg remained a center of mathematical and astronomical studies for fifty years.[5] The city was also a center for the production of celestial and terrestrial globes during the fifteenth and sixteenth centuries.[6] It is, therefore, noteworthy that several astronomical instruments--including an astrolabe, an armillary sphere, and a sextant--together with the portrait of Regiomontanus on folio CCLVr (Fig. 4)--also appear in the illustrations of the *Chronicle*. Thus, it is not surprising to learn that Schedel owned works by Regiomontanus as well as other astronomical books, such as one by the ancient astronomer and geographer Ptolemy.[7] Fifty years after the publication of the *Nuremberg Chronicle*, Copernicus' *De Revolutionibus* was published in Nuremberg.

Most often noted in the literature on the *Nuremberg Chronicle* are the 26 panoramic, two-page views of cities, such as the one of Nuremberg on folios XCIXv and Cr (Fig. 2), marking a noteworthy moment in the history of topographical illustration.[8] We, on the other hand, were most interested in the book's comet images, which are all quite small in comparison. There are actually thirteen comet illustrations in the *Chronicle*, a dozen more than the single image that purportedly shows Halley's Comet in A.D. 684. These images can be dated from around A.D. 471 to A.D. 1472. It turns out that they were meant more for highlighting the content of the text than for accurate depictions of the celestial events. Indeed, one of the appearances of a comet woodcut, number twelve in Table 1, stands for two separate comets.

1.1 THE PRINTED VERSIONS

The *Nuremberg Chronicle* is an incunabulum, the term used for books produced before 1501. It was published during a period of great experimentation in the technology and aesthetics of book illustration. Although there remain many aspects of its production that are enigmatic, in general, a number of features from manuscript illustration were influential on the *Nuremberg Chronicle*, like size, layout, and inclination toward frequent illustrations and enlarged initials, some of which were further embellished by hand in colored inks in various copies of the book. The book's printing history raises many interesting questions about the production techniques of early books and the role of illustration as a medium of visual communication. Since it is relatively common for an incunabulum, it is thought that many copies were preserved because the book was so elaborately laid out and well illustrated. When it was produced, the *Nuremberg Chronicle* was projected to be so popular that less than a year after the Latin edition appeared, a German edition with a more popularized text, translated by George Alt, was also published, and outsold the earlier Latin edition.

Only four woodblocks were used to show the fourteen illustrated comets in both the Latin and German editions, demonstrating that the images were stylized rather than meant

to illustrate actual historical comets. Indeed, different woodblocks were often used to illustrate the same historical comet in the Latin and German editions, as seen in Table 1. Thus, we cannot obtain any astronomical data by drawing conclusions about the actual appearance of historical comets from the illustrations in the *Nuremberg Chronicle*, and we surely cannot say that the image near the description of the bright comet on folio CLVIIr (Fig. 10), in the section for the years 684 to 693, illustrates the apparition of Halley's Comet in A.D. 684. In particular, we cannot use the image to resolve the question of Halley's Comet's rotation period or other astronomical problems. As for the text, it was compiled from numerous sources, including earlier chronicles, and gains in accuracy as the period approaches the date of Schedel's writing.

As diagrammed in Table 1, the first example of each of the four woodblocks appears in the first four comet illustrations of each edition, suggesting to us that the illustrations were designed chronologically. In later appearances, the woodblocks were sometimes rotated 90 degrees to the right or to the left, as shown in Table 1, in order to facilitate page layouts. In all, the head of the comet is always at the top right or top left, so not even the actual appearance of the comet in the sky is imitated. The third column gives the approximate span of dates of the section of the *Nuremberg Chronicle* in which the image appears, usually about 10 to 20 years in duration, which is sometimes the only information available about its date. Frequently we have been able to date a comet precisely from a careful reading of the internal information in the text, usually related to the sequence of kings, emperors, popes, and other kinds of rulers. Out of the fourteen comets illustrated, Schedel gives exact dates for the last four and for two of the penultimate four, as indicated in Table 1 by three asterisks (the single example with four asterisks indicates a mistake in the foliation). The final column of Table 1 gives the woodblock scheme for the German edition.

Of the thirteen comet illustrations in the *Chronicle*, only one definitely signals an apparition of Comet P/Halley: number twelve. It purports to represent Halley's Comet in 1456, but it also represents another comet in 1457. Two other time spans with comet illustrations allow for an association with Comet P/Halley: (1) that of the problematic section between 684 and 693 and (2) that of the section between 1288 and 1304, the latter of which may be associated with the bright comet of 1299 instead of Halley's of 1301.[9] The second column of Table 1 reveals that the third woodblock, which was used for the 1456 apparition of Halley's Comet, was also employed to illustrate five other comets in the Latin edition. The final column of Table 1 shows that in the German edition, the third woodblock was used to illustrate three different comets, while Halley's Comet of 1456 was illustrated by the fourth woodblock.

The next table, Table 2, shows the number of times each woodblock appears in both the Latin and German editions of the *Chronicle*. You will note that only the first woodblock type has a single appearance in each edition (Fig. 5). The first woodblock is also the only image that includes either any trace of a landscape setting or other celestial objects in the same image. According to the text, the other signs that also were reported in the sky during this period, and are thus included in the woodcut print, are lightning and an obscured moon, probably a lunar eclipse. The comet, labelled as such in the text, is drawn with a six-pointed head; its tail actually appears ironically and anachronistically more like a telescope! Because there were so many lunar eclipses in the period between 471 and 493,

Table 1: Comet Illustrations in the *Nuremberg Chronicle*

Figure No. and Folio	Latin Edition	Date	German Edition
1. CXLIv	1a	471-493 483?	1a
2. CLVIIr	2a	684-693 684?	2a
3. CLXVIIv	3a	804-813 813?	3a-l
4. CLXXIXr	4a	954-973 962?	4a
5. CLXXXVIr	3b	1004-1033 1005?	2b
6. CXCVIr	3c	1084-1094 1092?	2c-r
7. CCXIIIv	4b	1263*** (1244-1272)	4b
8. CCXXr	4c-l	1288-1304 1299?	4c
9. CCXXIIv	3d	1314*** (1305-1315)	4d
10. CCXXVr	3e	1347 (1335-1342)	3b
11. CCXXIXr (CCXXXIr)	2b	1351*** (1343-1362)	4e
12. CCLr	3f-l	1456*** 1457*** (1455-1457)	4f-l
13. CCLIIIIr	2c-r	1472*** (1471-91)	3c-l

In Table 1, the first column gives the consecutive numbering scheme we supplied plus the folio number in Roman numerals on which the comet illustration is printed. The second column gives an Arabic number for the woodblock, and then a letter signifying the number of the appearance of this woodblock (a=first time, b=second time, and so on). An "r" indicates the woodblock was rotated to the right from its first appearance and an "l" indicates that the woodblock was rotated to the left from its first appearance. When the date appears first, followed by the *Chronicle*'s sequence in brackets, then the date is secure. Many of the sequences indicated above in the third column from the left are only approximate because they mostly derive from the papal and imperial lineages that Schedel establishes as running commentaries throughout the text or sometimes from specific dates related to other events mentioned in the text. Three asterisks indicate that the date is secure.

Table 2: Types of Woodblocks Used in the Latin and German Editions

Type of Block	Latin	German	Type of Comet Head
1	1 time	1 time	6 points, 6 lines
2	3 times	3 times	8 points, 6 lines
3	6 times	3 times	6 points, 6 lines
4	3 times	6 times	cloud-like

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Fig. 5 The first comet woodblock, folio CXLIv, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. The Chapin Library of Rare Books, Williams College, Williamstown, MA.

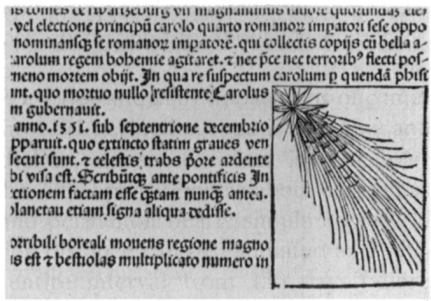

Fig. 6 The second comet woodblock, folios CLVIIr, CCXIXr, and CCLIVr, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. The Chapin Library of Rare Books, Williams College, Williamstown, MA.

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it is impossible to date this comet exactly. Since it is believed that the illustrations were prepared in sequence, it may be significant that this less realistic comet image was never repeated, and a landscape never again was included with a comet. It was probably felt that the comet's isolated form was far more effective as an individual illustration.

The second type of comet illustration appears three times in the Latin edition (Fig. 6), and three times in the German edition. The type was used first for the 684-693 interval, next for the comet of 1351, and finally for the comet of 1472. The comet of this block has an eight-pointed head, while its tail has been delineated by a series of bristly woodcut lines, a convention retained in the two subsequent comet image woodblocks.

The third type of comet image of the *Chronicle*, with a six-pointed head, appears six times in the Latin edition (Fig. 7), but only three times in the German edition. As one examines the six impressions of the woodblock in the Latin edition, one notices that bits of the image disappear in the later impressions, suggesting that the woodblock eventually wore down in the printing process. This breakage may account for its less frequent use in the German edition.

The fourth comet type appears three times in the Latin edition (Fig. 8) and six times in the German edition. This comet has a cloud-like head, which is perhaps closer to our modern view of a comet (Fig. 9), as shown in the significant photograph of the nucleus of the periodic comet Halley taken with the Halley Multicolour Camera on Giotto. This shape is difficult to understand, however, in terms of a late fifteenth-century point of view and the ideas then current about comets.

As for the purported image of Halley's Comet in A.D. 684 in the *Nuremberg Chronicle* (Fig. 10), it is far from certain that it actually is even meant to illustrate Comet P/Halley. Writing about the comet within the 684-693 interval, Schedel, as is the case with many chroniclers, mentions no year in the text. Even though the comet image appears in this section, we have found that Schedel, like other chroniclers, frequently refers to events that take place outside the time span indicated in the heading of a given section. However, in the previous paragraph, Schedel refers to the death of Pope Agatbo in A.D. 681. In the following paragraph, Schedel mentions both a solar and a lunar eclipse. Since solar eclipses occurred over Western Europe in 685, 686, 688, 692, and 693, but no lunar eclipses occurred there in either 684 or 685, the internal astronomical evidence is ambiguous and inconclusive and, therefore, cannot help us to pinpoint the comet's date.[10] On folio CLVIIr, Schedel describes the apparition thusly: "A hairy star which the Greeks call Comet portended complete and such great calamity because it appeared for three continuous months." ("Stella crinita quam greci Cometem vocant indicabat perfecto tot clades quia tribus continuis mensibus apparuit.") Schedel's description leads us to believe that if the observations were correct, it was indeed a very grand comet. The only secure spectacular comet for the period in question, although others are recorded, is Comet P/Halley in 684, so that by default we assign a tentative date of 684 to the illustration.[11] If the illustration does indeed allude to Halley's Comet in 684, we must remember that it was executed 800 years later and was reused for two different comets in both the Latin and German editions. Thus, it cannot show the 684 passage of Halley's Comet with any accuracy. It is, in reality, only a stylized woodcut of a generic comet as conceptualized by a fifteenth-century artist. The illustration is, more precisely, merely the earliest apparition

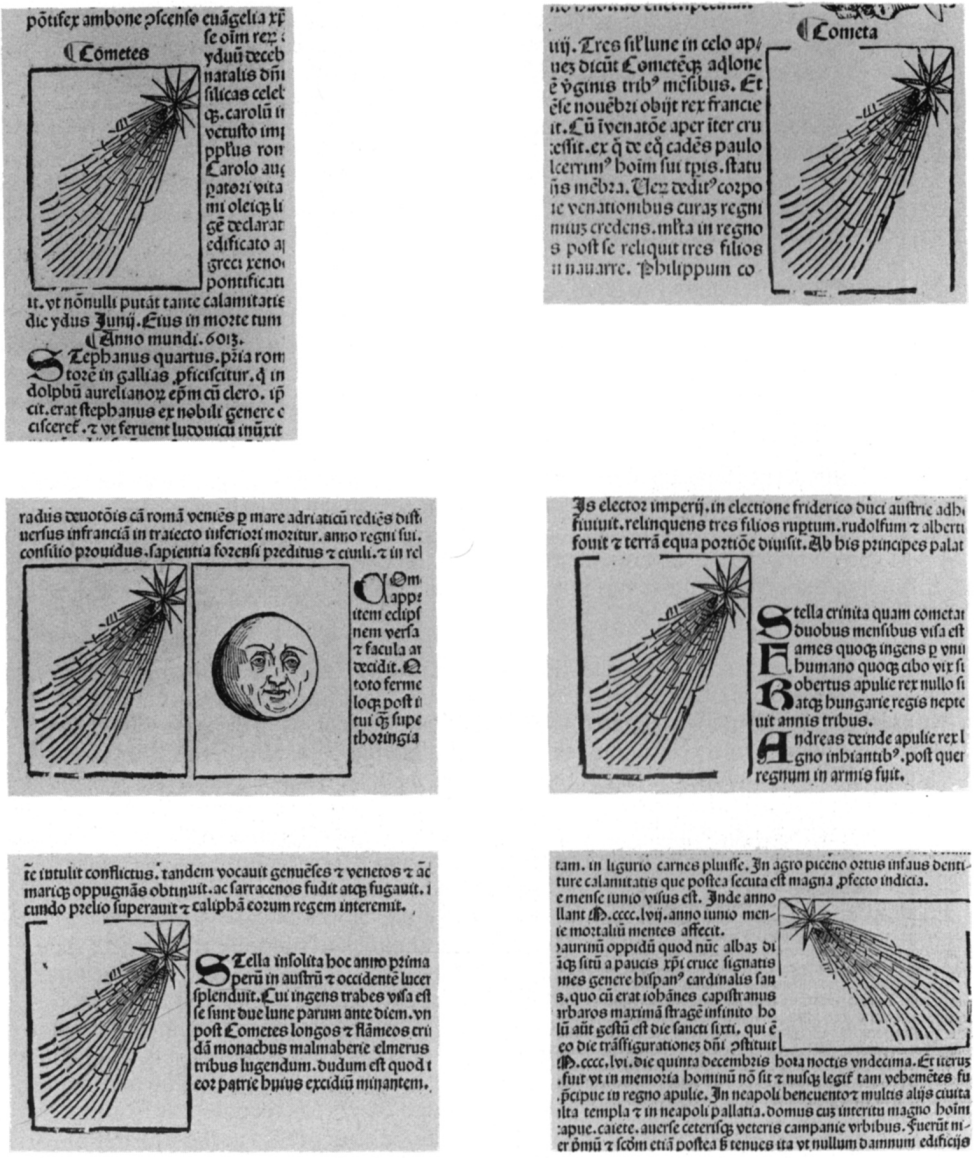

Fig. 7 The third comet woodblock, folios CLXVIIv, CLXXXVIr, CXCVIr, CCXXIIv, CCXXVr, and CCLr, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. The Chapin Library of Rare Books, Williams College, Williamstown, MA.

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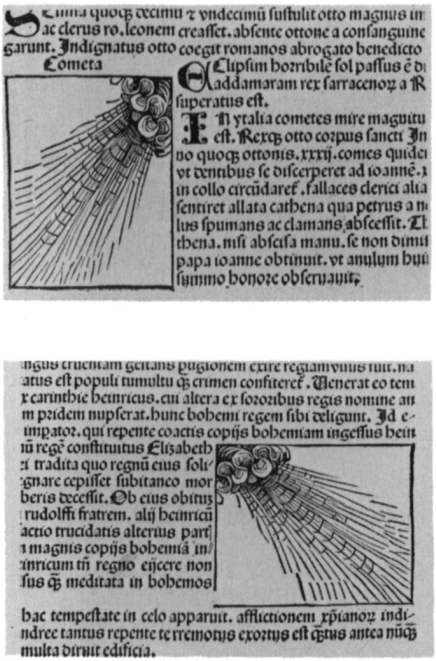

Fig. 8 The fourth comet woodblock, folios CLXXIXr, CXIIIv, and CCXXr, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. The Chapin Library of Rare Books, Williams College, Williamstown, MA.

Fig. 9 Close-up of Halley's Comet. c 1986 Max-Planck Institut für Aeronomie, Lindau/Harz, courtesy of H.U. Keller/Taken with the Halley Multicolour Camera on Giotto.

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of Comet P/Halley for which an illustration was made long ago, albeit long after the fact.

1.2 THE EXEMPLARS

By the contract of December 29, 1491, for the *Nuremberg Chronicle*, the artists, Wolgemut and Pleydenwurff and their assistants, were required to prepare complete layouts for both the Latin and German editions.[12] Such a novel step was necessary because the book was to be so lavishly illustrated. These manuscript layouts, or dummies, are known as "Exemplars." They never have been published in facsimile and their comet images never have been reproduced. The Exemplars (manuscripts Cent.II.98 and Cent.II.99 in the Nuremberg Stadtbibliothek) were first listed in J. P. Roeder's catalogue of the Nuremberg Library, dated to 1742.[13] Between the two world wars, they were almost totally forgotten. During the Second World War, they were removed from the Stadtbibliothek and thus saved when there was a fire bombing of the Eigendenplatz on January 2, 1945, at which time the Stadtbibliothek was totally demolished. Although for a time it was presumed that the Exemplars had been lost, in 1965 they were relocated in the holdings of the rebuilt Nuremberg Stadtbibliothek.

Prior to the Exemplars, Schedel certainly wrote another manuscript of the text, and perhaps drawings were prepared for some of the more complex, ambitious pages and/or illustrations. Today, five of these earlier, separate, two-sided leaves are in the Nuremberg Stadtbibliothek. They were found in 1972 in the binding of a Bible dating from 1472.[14] The existence of the five leaves, which do not contain any comet images, proves that the Exemplars represent the nearly final stage of preparation of the *Chronicle*. Wilson believes that some of the preparatory drawings for the *Chronicle* may have been drawn by the young Albrecht Dürer, who had worked in the shop of Wolgemut between 1486/87 and 1490.[15]

The Exemplar drawings for the woodblock illustrations are sketchy, as we see in the Latin Exemplar drawing for the city of Nuremberg (Fig. 11). But the Exemplars are very significant because they prove the supremacy of the illustrations together with the pleasing layout over the demands of the text; it seems in many places that the text was added after the illustrations were planned. Also, between the Exemplar stage and the printed book, many changes were made in the format, and a sizable amount of material was eliminated to fit the printed page. There are sometimes brief captions on or near the illustrations; these often vary between the Exemplars and the printed books.

It is difficult to attribute the sketchy drawings of the Exemplars, as well as the general designs themselves, to any specific artist or artists. After the Exemplars, the woodblocks were cut by an artisan known as the *formschneider* (form-cutter). The fact that we see the hand of this worker in the woodblocks also blurs our ability to follow the path of the illustrations' evolution.

It appears from the statistical evidence in the comparisons of the graph (Fig. 12) that the German Exemplar derives from the Latin Exemplar, rather than from the Latin printed book. These comparisons suggest that the German Exemplar may have been prepared before the Latin book was printed or that both Latin and German books followed from the

Fig. 10 Halley's Comet in A.D. 684?, folio CLVIIr, from Hartmann Schedel, *Nuremberg Chronicle*, 1493 The Chapin Library of Rare Books, Williams College, Williamstown, MA.

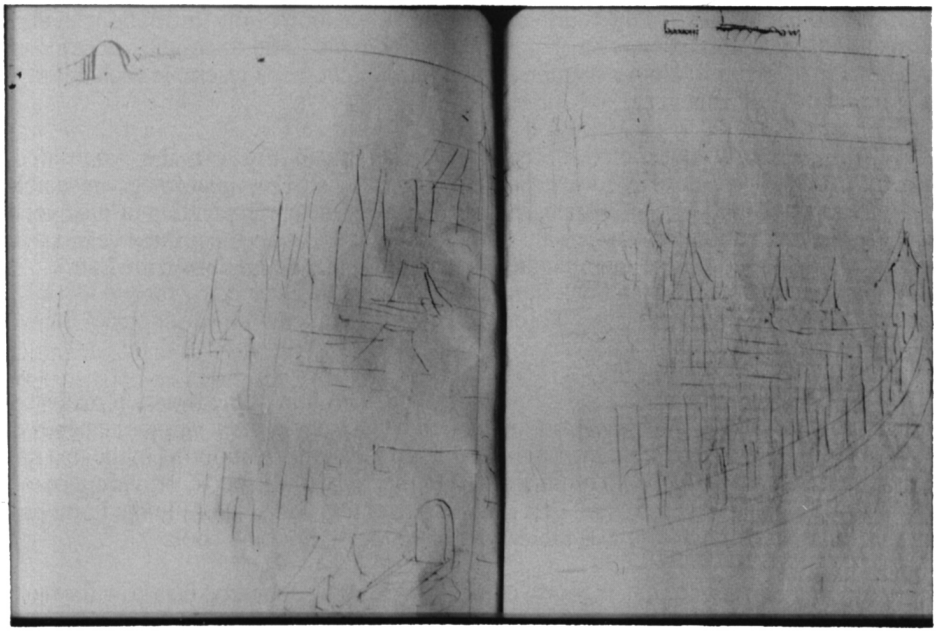

Fig. 11 View of Nuremberg from the Latin Exemplar, *Nuremberg Chronicle*, before 1493. Stadtbibliothek, Nuremberg.

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same original model, a conclusion buttressed by the evidence in the contract of 1491. This information is especially significant in an examination of the comet images, which have never been discussed thoroughly, because none of the thirteen comet illustrations in the two Exemplars have been reproduced.

Let us look at the first comet image in both printed books and Exemplar versions, the only illustration that is complex (Fig. 13). It is a different size and shape in the Latin Exemplar than in the German Exemplar, although it contains the same elements. The German Exemplar image is compressed from right to left, making it square rather than rectangular. This compression makes it match more closely the illustration in the printed Latin edition, indicating that the German Exemplar probably was made after the woodcut for the Latin edition was planned. Indeed, the contract of 1491 notes that some of the illustrations had already been cut at the time of the contract signing. Note that the sketches in the two Exemplars seem to have been done by the same hand, whereas the hands of different scribes are evident in the two texts.

The graph (Fig. 12) summarizes the relationship between the printed and preparatory Exemplar comet images. In the fourth cluster, the orientation of the illustrations in the German Exemplar corresponds most closely to those in the Latin Exemplar, more closely, in fact, than the Latin Exemplar and the Latin edition of the book resemble each other, as shown in the second cluster.

Regarding the first appearance of the second comet image (Fig. 14), the two printed comet illustrations are similarly oriented; the two preparatory Exemplar images resemble each other, but each faces in the opposite direction from the corresponding printed version. Furthermore, the Exemplar versions are horizontal images, while the printed versions are vertical in orientation, suggesting that the German Exemplar derived from the Latin Exemplar, but that the German book illustration was then influenced by the woodcut prepared for the Latin book. Also, all four images are labelled with variations of the word "comet."

For the first representation of the third comet type, the Latin printed version matches the Latin Exemplar sketch, while the oppositely oriented German printed version matches the German Exemplar (Fig. 15). In the Latin Exemplar, the comet mentioned in the text had to be drawn in the margin since no room was left in the body of the book, providing one instance where the text was written first and the illustration added later. In the Latin printed version, the comet illustration was moved over into the body of the book.

For the first appearance of the fourth comet image, both printed books show for the first time a cloud-like head for the comet, while the corresponding Exemplar drawings show only the same star-like head as in the earlier sketches (Fig. 16). This evidence suggests either that there was another drawing between the Exemplar and the woodcut or that the *formschneider* invented the cloud-like comet head.[16]

One could continue this analysis for all the comet illustrations, but only one additional illustration will be considered, since after the fourth one, all are repetitions of woodblocks two through four. For the fifth comet image of the *Chronicle*, a repetition of the third type, the two Exemplar sketches are similar, but the comets in the two editions of the book derive

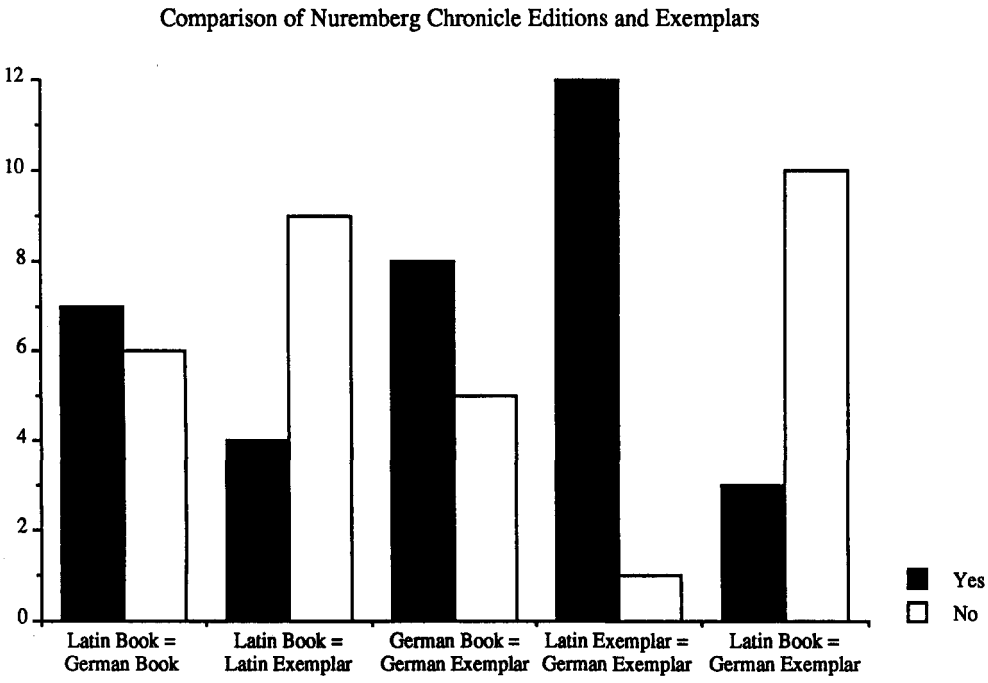

Fig. 12 Graph comparing the books and Exemplars of the Latin and German editions of the *Nuremberg Chronicle*.

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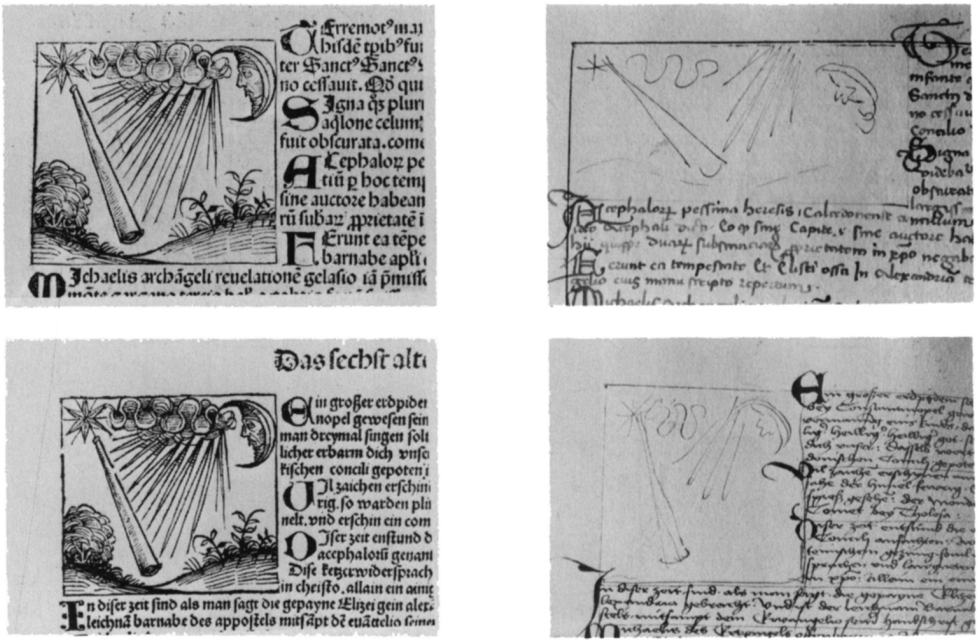

Fig. 13 The first comet image in both printed books and Exemplars, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. The Chapin Library of Rare Books, Williams College, Williamstown, MA, and the Stadtbibliothek, Nuremberg.

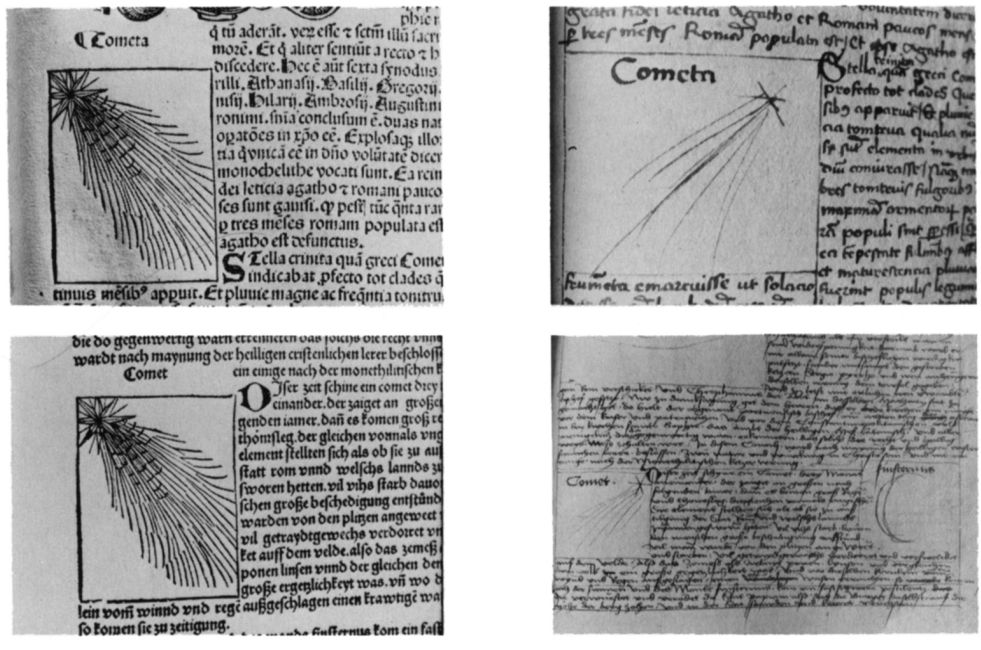

Fig. 14 The second comet image in both printed books and Exemplars, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. The Chapin Library of Rare Books, Williams College, Williamstown, MA, and the Stadtbibliothek, Nuremberg.

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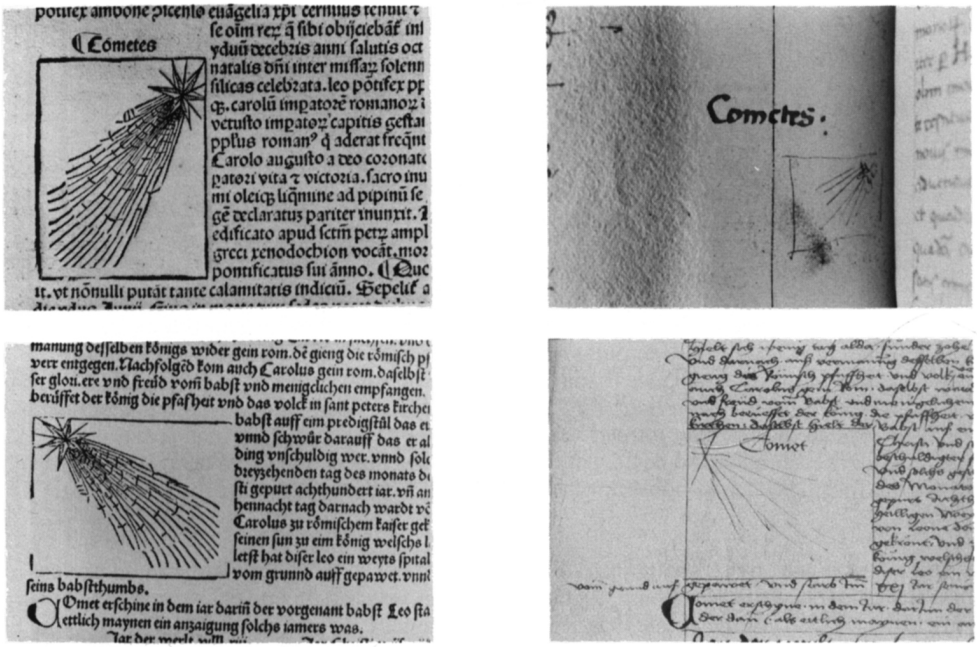

Fig. 15 The third comet image in both printed books and Exemplars, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. The Chapin Library of Rare Books, Williams College, Williamstown, MA, and the Stadtbibliothek, Nuremberg.

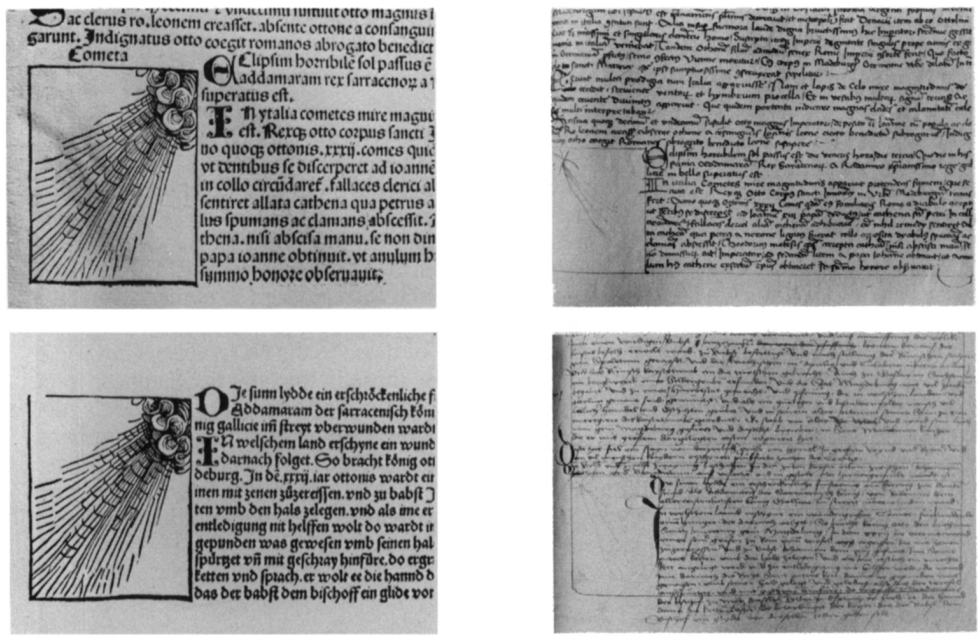

Fig. 16 The fourth comet image in both printed books and Exemplars, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. The Chapin Library of Rare Books, Williams College, Williamstown, MA, and the Stadtbibliothek, Nuremberg.

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from two different woodblocks (Fig. 17). Although the moon adjacent to the comet in both editions is printed from the same woodblock, it appears on the opposite side of the comets in the two printed books.

A further consideration of the graph (Fig. 12) reveals a number of significant conclusions about the *Nuremberg Chronicle* Exemplars. It is interesting to note in the graph that while the comet images in the Latin and German printed books agree half the time (cluster 1), the Latin book image is different from the Latin Exemplar roughly two-thirds of the time (cluster 2). Thus, the layout of the Latin book was still in a formative stage throughout its production. The German book, on the other hand, does not differ as often from the German Exemplar (cluster 3), indicating that the format of the book was set more firmly in the Exemplar stage. Furthermore, the German Exemplar matches the Latin Exemplar in all but one of the cases (cluster 4), proving that the German Exemplar was drawn from either the Latin Exemplar or from a common model. Indeed, the evidence gathered in column five indicates that the German Exemplar is almost always different from the Latin printed book. Moreover, the fact that the cloud-head comet, which is the most common type in the German printed version, never appears in the German (or, for that matter, either) Exemplar, indicates that the German Exemplar may have been completed before the fourth comet woodblock type on folio CLXXIXr was cut for the earlier Latin edition.

In 1508-13, some years after the *Nuremberg Chronicle*, the *Lucerne Chronicles*, an illuminated manuscript written by Diebold Schilling, was produced. It also contained four comet images, including the one that illustrates the apparition of Comet P/Halley in 1456 (Fig. 18).[17] These brightly colored illustrations are more ambitious than those of the *Nuremberg Chronicle* and are not merely symbolic, attention-getting devices to mark the text, as in the earlier printed book. This example from the *Lucerne Chronicles* features a landscape as well as the supposed pernicious effects, such as red rain and abnormal births, that followed in the comet's wake. Some of these effects are the classic symptoms of the black plague. Please note that the comet is shown here twice, both before and after perihelion. Another illustration in this manuscript depicts the meteorite that fell in Ensisheim, Germany, in 1492, and was later exhibited in the town's cathedral.[18]

The inclusion of the comet information in the *Nuremberg Chronicle* represented an important first step in cataloguing the history of comet apparitions. By highlighting the citations of the comets with woodcut illustrations, Schedel's book brought comet apparitions into the limelight for the masses, even though the *Nuremberg Chronicle* was not the first printed chronicle to use comet illustrations. In fact, after 1481, several editions of Werner Rolevinck's *Fasciculus Temporum*, the earliest printed world history and the bestseller of the century with 35 editions (27 before the *Nuremberg Chronicle*, which it is thought in part to have inspired) contain a few comet images.[19] But these few, tiny woodcut illustrations are less than a quarter the size of those in the *Nuremberg Chronicle* and by comparison appear sketchy and weak, making those in the later book appear more ambitious. It is the sheer number of comet illustrations in the *Nuremberg Chronicle* that is so impressive, even though many of them are repetitions. Because of the large number of copies of Schedel's book, all with thirteen comet illustrations, the *Nuremberg Chronicle* and its comets enjoyed a wide influence. Schedel's material was used frequently by later significant chroniclers, such as Lycosthenes, who published a much less objective and

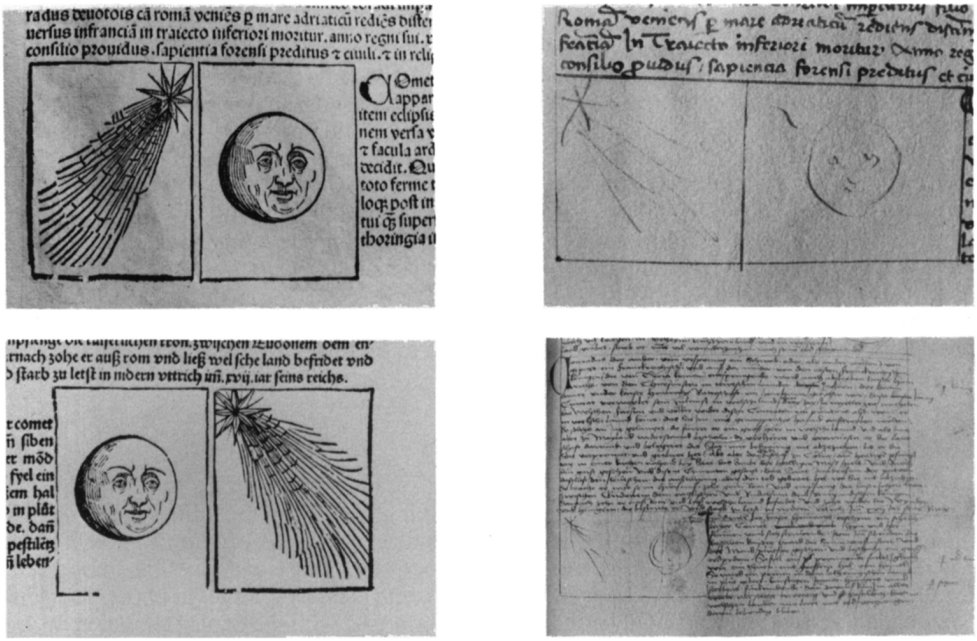

Fig. 17 The fifth comet image in both printed books and Exemplars, from Hartmann Schedel, *Nuremberg Chronicle*, 1493. The Chapin Library of Rare Books, Williams College, Williamstown, MA, and the Stadtbibliothek, Nuremberg.

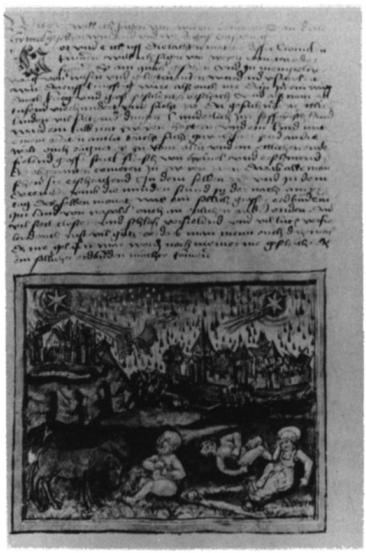

Fig. 18 The Apparition of Halley's Comet in 1456, folio LXIv, from Diebold Schilling, *Lucerne Chronicles*, 1508-1513. Zentralbibliothek, Lucerne.

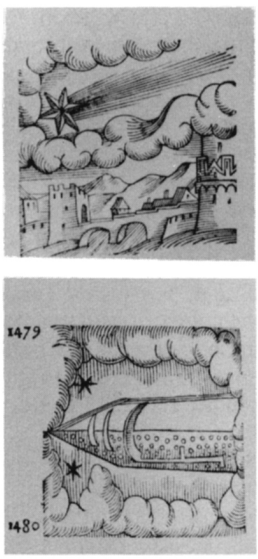

Fig. 19 Two comets from Conrad Lycosthenes, *Prodigiorum ac ostentorum chronicon*, 1557. Spencer Collection, The New York Public Library, Astor, Lenox, and Tilden Foundations, New York.

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more sensational chronicle, *Prodigiorum ac ostentorum chronicon*, in 1557, which also occasionally illustrated comet images (Fig. 19) to accompany reports in the text, some of which derived from the *Nuremberg Chronicle*. As with the *Lucerne Chronicles*, the astronomical events in Lycosthenes' book were linked to supposed effects on Earth. The references to natural phenomena that were deemed to have consequences on Earth, prodigies, in Lycosthenes' book are much more frequent and lurid than the allusions in the *Nuremberg Chronicle*. Schedel's descriptions are fairly dispassionate, and were not confined to the then-common classification of comets, which had come down from Ptolemy.[20] Long after Schedel's *Chronicle*, its influence was still felt. For example, over a century and a half later, Johannes Hevelius often referred to the *Nuremberg Chronicle* in his *Cometographia* of 1668. So did Pingré in his *Cométographie* (vol. 1, 1783; vol. 2, 1784). In summary, we see that the *Nuremberg Chronicle* was a transitional work in the history of comets, with Schedel's verbal and visual references to comets serving as a prelude to scientific attitudes that would soon begin to flourish with the Renaissance that was then just dawning in Germany.

2. Bavarian Broadsides

The German name for broadsides is *Flugblatt*, deriving from from the words *Flug*, meaning flight, and *Blatt*, signifying sheet. Broadsides or broadsheets are single-leaf woodcuts, mostly of folio size, that are printed on one side; they functioned like tabloids for the sixteenth and seventeenth centuries. These prints usually feature an upper part with a dramatic title and an arresting illustration and a lower part with the explanatory text in poetry or prose (the prose sheets tend to be more objective and can include observational data). The anonymity of many artists who provided the woodcut illustrations for the broadsides, especially prior to 1550, has dictated their frequent classification by their printers or publishers. After 1550, the designer is sometimes referred to in broadsides, and is thus identifiable, as a *briefmaler* (literally a painter or colorer of prints) or a *formschneider* (now meaning not just a cutter of the woodblock but also an artist in his own right). Sometimes broadsides were reengraved and reprinted several times. The popularity of these broadsides goes hand in hand with the concurrent developments in printing and the invention of movable type. Their texts report the local effects of phenomena, while their woodcut illustrations effectively convey the sense of awe and panic associated with the natural and political calamities they report. Broadsides peaked in number between 1570 and the late seventeenth century, although they continued to be produced into the ninteenth century. These sheets flooded the countries of Europe, especially Germany, with images of unusual natural phenomena that were interpreted as omens.[21] The great majority of all astronomical broadsides are devoted to comets (according to Véron and Tamman, 28 comets are recorded in 208 known broadsides), while the center of astronomical broadside production was concentrated in the southern German-speaking region, notably in the cities of Nuremberg, Augsburg, and Strassburg.[22] This geographical concentration links the development of broadsides, which began in earnest in the sixteenth century, with the *Nuremberg Chronicle* production.

In spite of their superstitious, hysterical journalism, fed by turbulent political and religious upheavals--like wars and the Reformation--these broadsides reveal a nascent objectivity, a quasi-scientific attitude. They are progressive because they aim to report

events as quickly as possible to the public. About twenty percent of the authors of the comet sheets surveyed by Véron and Tamman were professional astronomers, so that broadsides occasionally have proven of direct value in making astronomical computations and descriptions.[23] Whereas the ambitious cityscapes and simple comet images of the *Nuremberg Chronicle* never appear in the same illustration, once broadsides began to include comets, they usually combined the comet with a landscape in order to pinpoint the locality of the apparition.

One of the earliest single-leaf woodblock prints containing a comet is allegorical rather than observational, and as such is not really a broadside (Fig. 20). This handcolored woodcut depicts a satirical struggle between Pope Pius II and Emperor Frederick III with apocryphal proverbs inscribed as the print's text; it was issued several times, the example shown being produced in Ulm around 1460-1470.[24] The stylized comet, inscribed *cometa*, is in the upper right; it is difficult to ally with an historical comet, although its genesis may be due originally to the appearance of Comet P/Halley in 1456. By comparison, the comets of the *Nuremberg Chronicle* appear almost naturalistic. As early as 1490, Jorg Glockendon issued a broadside (Fig. 21) that was owned by the author of the *Nuremberg Chronicle*, Hartmann Schedel, who reputedly had a substantial collection of representations of wondrous events.[25] The print depicts a symbolic depiction of an apparition in the sky observed in Constantinople on the 13th or 20th of July 1470, an event that has been interpreted by Wilhelm Hess as an allegorical representation of the northern lights and their changing configurations.[26] By comparison, the comets in the *Nuremberg Chronicle* are very naturalistic. This woodcut was made only a year before the contract for the *Chronicle* was signed, and, as mentioned previously, it is believed that work had begun on the *Chronicle* before the contract was signed.

In 1921, Gustav Hellmann recorded all the broadsides and pamphlets then available that described meteorological happenings during the sixteenth century, finding that the city of Nuremberg ranked first among cities in Germany in the number of printers issuing such broadsides, as well as first in the actual number of celestial events that they depicted. In fact, the numbers for Nuremberg are almost double those of the next contender, the city of Augsburg.[27] This fact is presumably an additional consequence of the the astronomical activities in Nuremberg during the fifteenth and sixteenth centuries, as well as further evidence of its status as a printing center. This knowledge provides a context for the comet illustrations of the *Nuremberg Chronicle*.

When the bright comet of 1556 appeared, with its tail stretching to 100° and its peak brightness equivalent to that of Jupiter, it engendered comet treatises as well as broadsides, like the one by the Nuremberg printer Valentin Neuber, who specialized in astronomical tracts and song sheets. This broadsheet (Fig. 22) illustrates the effects of this comet and of two earthquakes, in Constantinople and Rossana, on the 5th of March of that year. In this colored woodcut, buildings are falling down and are on fire, while people flee in panic. The delineation of the comet is slightly more refined than in the comet illustrations of the *Nuremberg Chronicle*. Interestingly, the moon in this print is shown with a stylized face as in the *Chronicle*. The comet of 1556 also is depicted hovering over a generic German town in an anonymous broadside in the collection of the Zentralbibliothek, Zürich (Fig. 23), where, as in the previous example, the comet is very stylized with a schematic star for a head.

Fig. 20 Allegory of the contest between Pope Pius II and Emperor Frederick III, c. 1470. Staatsbibliothek, Munich.

Fig. 21 Broadside with a symbolic representation of the northern lights, 1491, formerly in Hartmann Schedel's collection. Staatsbibliothek, Munich.

Fig. 22 The Comet of 1556 over Constantinople, from a broadside by Valentin Neuber. Zentralbibliothek, Zürich.

Fig. 23 The Comet of 1556 over a Generic Town. Zentralbibliothek, Zürich.

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The comet of 1577, famous because of Tycho Brahe's observations and book about it, was a daylight comet. It coincided with the peak of the broadside era, and was illustrated a great many times. Perhaps the most spectacular illustration is the broadside by Jiri Daschitzky, showing the comet on 12 November over Prague, as reported in the text by Peter Codicillus (Fig. 24). In this woodcut, although the comet's head is shown as a star, its tail curves in a realistic fashion. In addition, the star is more integrally incorporated into the comet's head, rather like a center of condensation, and thus corresponds more closely to the comet's observed appearance. Therefore, the artist presumably relied more on what he--or another observer--saw than on current artistic conventions available for his use. Indeed, he even has represented an artist, perhaps himself, in the foreground of the print drawing the comet, while a young apprentice holds a lantern in order to illuminate his rendering (Fig. 25). This is the first depiction we know of that shows an artist actually rendering a comet while observing it. Also note that depicted in the print are the crescent moon, more simplified and so more realistic than in earlier woodcut depictions, as well as five of the zodiacal constellations and a falling star. Another broadside, by Georg Mack the Elder--a *briefmaler*, painter, and illuminator, also shows the comet of 1577 over Nuremberg, with similar innovations (Fig. 26).[28] Often images by different artists were similar, perhaps because they were patterned after the same source, either visual, literary, or scientific, or a combination of all three. A case in point is the broadside by Bartholomäus Käppeler--a *briefmaler,* as printed on this broadside--that shows the comet of 1577 on 12 November over Augsburg with a similar modeling of the tail and small head (Fig. 27).[29] Another image of the same comet on 13 and 14 November (Fig. 28) is by Hans Schultes the Elder--a *briefmaler* and *formschneider,* both professions that are indicated in the inscription of this broadside, as well as a painter and publisher. Like the preceding example, this broadside features a similar feathering in the modeling of the tail and a modest head.[30] All of the comets in these four prints reflect the more naturalistic manner that was coming into vogue in 1577, as knowledge about the nature of comets was expanding.

Three years later, the comet of 1580 is shown moving through the sky in October among the constellations, again over Augsburg, in a broadside by Hans Rogel the Elder (Fig. 29). Rogel was a teacher of calligraphy, a *formschneider*, *briefmaler*, and publisher, who signed this broadside indicating his occupation as a *formschneider*. He depended on the observations of the comet made by Georg Henisch, who was a physician, mathematician, and instructor at St. Anna's Gymnasium.[31] It is significant that the comet's path in the heavens, its celestial context, is indicated in the print by a number of constellations.

In 1664-65, another bright comet appeared, which is clearly depicted in a print (Fig. 30) that charts its astronomical context with a more scientific rendering of the stars, coordinates, and the progress of the comet across the heavens. Another broadside of the comet of 1664-65 continues this more specific approach, illustrating the comet proceeding through the constellation Corvus (Fig. 31). In both illustrations of the comet of 1664-65, attention has obviously been given to realistic depictions of the tail. Furthermore, the head in the first print appears as a bright condensation rather than as a star-like configuration, though other images of that time still show a conventionalized star for the head.

Fig. 24 The Comet of 1577 over Prague, from a broadside by Jiri Daschitzky, as reported by Peter Codicillus. Zentralbibliothek, Zürich.

Fig. 25 Detail of the comet of 1577 in fig, 24.

Fig. 26 The Comet of 1577 over Nuremberg, from a broadside by Georg Mack. Zentralbibliothek, Zürich.

Fig. 27 The Comet of 1577 over Augsburg, from a broadside by Bartholomäus Käppler. Zentralbibliothek, Zürich.

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Fig. 28 The Comet of 1577 over Augsburg, from a broadside by Hans Schultes the Elder. Zentralbibliothek, Zürich.

Fig. 29 The Comet of 1580 over Augsburg, from a broadside by Hans Rogel. Städtische Kunstsammlungen, Augsburg.

Fig. 30 The Comet of 1664-65, from a broadside with a drawing in the left margin. Stadtbibliothek, Nuremberg.

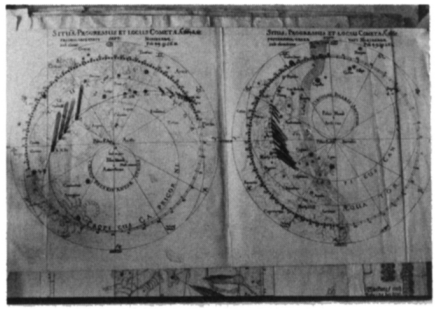

Fig. 31 The Comet of 1664-65, from a broadside. Stadtbibliothek, Nuremberg.

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The bright comet of 1680 was the first comet discovered with a telescope. Gottfried Kirch found it on November 14, 1680. This sun grazer, a brilliant daylight comet with a tail of 90°, was observed in England by Edmond Halley and Isaac Newton.[32] It was visible from December 1680 through February 1681. An unusually large number of representations of this comet were made. In fact, of the 208 comet broadsides surveyed by Véron and Tammann, 62 refer to this comet.[33] An unusual print, a copper etching incorporated into a larger woodblock with the text, by Johann Jacob Schönigk (a publisher and printer of Augsburg) presents an unusual image of this significant comet (Fig. 32). The new process of etching onto a metal plate, pioneered in the seventeenth century, accounts for the fine detail shown in the center of the print (Fig. 33). Here, the comet of 1680 is shown above Augsburg in its actual orientation at the time of the crescent moon. However, the comet is employed in a superstitious way, as an indicator of time and a presage of doom within a macabre cosmic clock whose numerals are composed of death's heads, bones, and instruments of torture. In contrast, a simpler etching by Jacob Koppmeir, an Augsburg printer, of the comet of 1680 over Augsburg also shows the long, thin tail and the crescent moon that many accounts record (Fig. 34). We should notice that the crescent phase is correctly oriented to correspond to the gradation of twilight on the horizon of the print, though the shape of the crescent is not correct. The text of the Koppmeir broadside indicates that the comet had been invisible for three weeks because of the sun's rays, thus implying that a single comet had been seen both pre-perihelion and post-perihelion. Another view of Augsburg with the same comet appears in an anonymous woodcut (Fig. 35), where the vertical orientation of the comet's tail was changed to a horizontal one, probably to fit the change in the broadside's format. Furthermore, the collection of constellation figures, including Cygnus, Draco, and Lyra, that are similar to those in the preceding print suggest a common source. It is also interesting that in the lower lefthand corner of the woodcut (Fig. 36), we see a finely dressed gentleman observing the comet with a telescope. Abraham Bach, a *briefmaler* of Augsburg (as indicated in the inscription at the bottom margin of the broadside), also produced a woodcut of the comet of 1680 over Augsburg (Fig. 37). In all aspects, it is a generalized derivation from the previous broadsides, containing a very similar cityscape and foreground observers, but the comet's more elongated tail points in the opposite direction, and no constellations are depicted in the narrow sky.[34]

A great departure in the history of the representation of comets in broadsides occurs in the very detailed etching of the comet of 1680 over Nuremberg by Johann Jacob von Sandrart (Fig. 38). Here, the comet is being observed in a scientific manner from the Nuremberg observatory grounds with many telescopes and other astronomical instruments that dominate the foreground. The large quadrant even vies with the comet as the center of attention for the viewer's eye. The etching is the first depiction of such a major scientific assault on a comet. The etching's inscription includes many scientific details about the position of the comet and the observing site, and thus represents an important step in transforming comets from spectacles of awe to scientific objects of serious study. Taken as a group, all the depictions of the Great Comet of 1680 show science beginning to triumph over superstition, even before Newton's *Principia.*

This sampling of prints brings us from the early observations reported in the

Fig. 32 The Comet of 1680 over Augsburg, from a broadside by Johann Jacob Schönigk. Stadtbibliothek, Augsburg.

Fig. 33 Detail of the comet of 1680 in fig. 32.

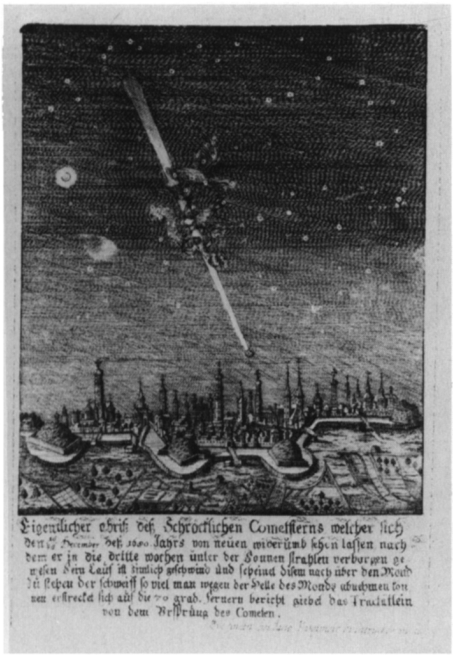

Fig. 34 The Comet of 1680 over Augsburg, from a broadside by Jacob Koppmeir. Prints Division, The New York Public Library, Astor, Lenox, and Tilden Foundations, New York.

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Fig. 35 The Comet of 1680 over Augsburg, from an anonymous broadside. Städtische Kunstsammlungen, Augsburg.

Fig. 36 Detail of fig. 35.

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Fig. 37 The Comet of 1680 over Augsburg, from a broadside by Abraham Bach. Städtische Kunstsammlungen, Augsburg.

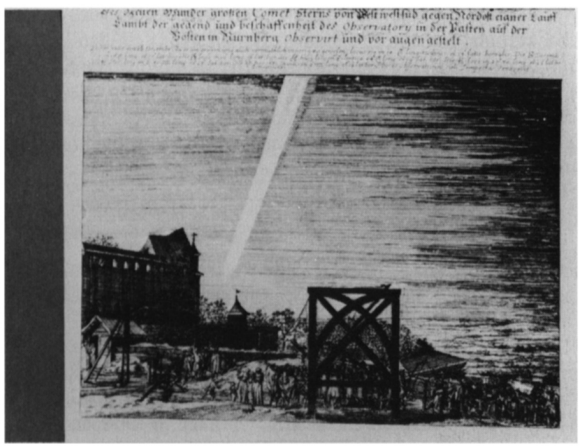

Fig. 38 The Comet of 1680 from the Nuremberg Observatory, from a broadside by Johann Jacob von Sandrart. Prints Division, The New York Public Library, Astor, Lenox, and Tilden Foundations, New York.

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Nuremberg Chronicle to the time of Newton (Fig. 39) and Halley (Fig. 40), who began the scientific process that we utilize today. Two years after the comet of 1680, the next bright comet, which inspired only nine broadsides, according to Véron and Tammann, and had a tail that never spanned greater than 30°, turned out to be in the periodic series that Halley identified and that we now name after him.[35] Would that he could see what was discovered from the ground and from space when his comet returned in 1986, as depicted in the painting *Rendezvous with Halley's Comet in 1986* by Rudolf Brammer (Fig. 41). In conclusion, another comet painting by Sigmar Polke (Fig. 42) suggests that even in our own decade, comets remain powerful visual images and metaphors for German artists as well as objects of study for astronomers.

Footnotes

We would like to thank Robert Volz, Dr. Roy Wright, Dr. Elisabeth Beare, Wayne Hammond, and Emma Hoops for their invaluable assistance. We are also most grateful to the National Endowment for the Humanities for Travel to Collections Grants to each of us, as well as the Committee on Faculty Scholarship of Wheaton College and the Division III Research Grant Committee of the Bronfman Science Center of Williams College. JMP thanks the Institute for Advanced Study for its hospitality. He also acknowledges an American Astronomical Society International Travel Grant.

[1] Baer, L. (1903) *Die Illustrierten Historienbücher des 15. Jahrhunderts*, Heitz, Strassburg, LXXVff, gives a chronology for illustrated printed histories after 1473.

[2] *Liber cronicarum (cum] figuris et ymagi[ni]bus ab inizio mu[n]di.* The reproductions in this article are taken from the Klopfer Copy in the Chapin Library of Rare Books at Williams College. (The German edition is entitled *Das Buch der Croniken und Geschichten.*) Johann Schönsperger of Augsburg published three smaller pirated editions in Latin (1497) and German (1496 and 1500).

[3] General background references include: Bullen, H.L. (1930) *The Nuremberg Chronicle*, Book Club of America, San Francisco; Shaffer, E. (1950) *The Nuremberg Chronicle*, Dawson Book Shop, Los Angeles; Wilson, A. (1969) *The Nuremberg Chronicle Designs*, Roxburghe Club of San Francisco and the Zamorano Club of Los Angeles, San Francisco; Rücker, E. (1973) *Die Schedelesche Weltchronik*, Germanisches Nationalmuseum, Munich; Zahn, P. (1974) *Neue Funde zur Entstehung der Schedel'schen Weltchronik*, Renaissance Vorträge, Stadt Nürnberg Museen, Nuremberg; and Wilson, A. (1976) *The Making of the Nuremberg Chronicle*, Nico Israel, Amsterdam.

[4] For Schedel's library, see Stauber, R., and Hartig, O. (1908) *Die Schedelsche Bibliothek*, Herdesche Verlagshandlung, Freiburg im Breisgau. On pages 240*ff* are listed the modern histories in his library.

[5] His press existed from 1471-75, and from it Regiomontanus issued a broadside listing a large number of scientific texts that he intended to publish (the broadside is described in [1914] *Einblattdrucke des XV. Jahrhundert*, Heitz, Strassburg, reprinted in 1968, and reproduced in

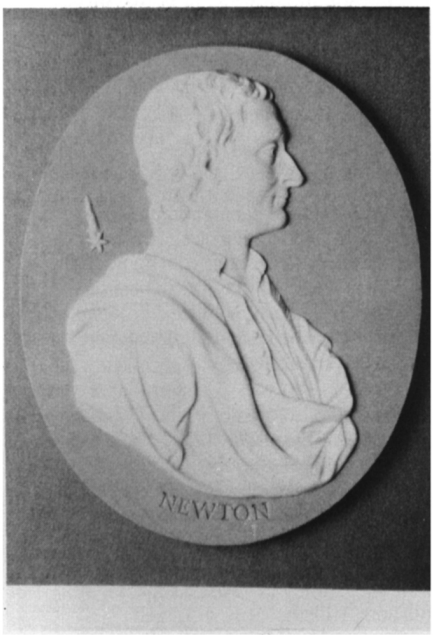

Fig. 39 Wedgwood plaque of Sir Isaac Newton, probably with a schematic representation of the comet of 1680 so influential on his theories. City Museums and Art Gallery, Birmingham.

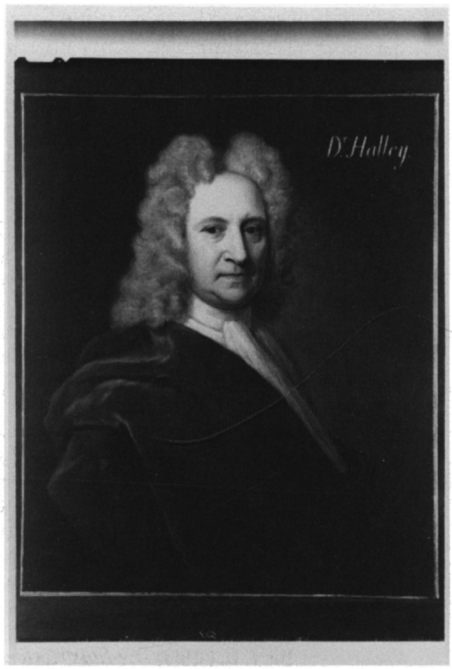

Fig. 40 *Portrait of Sir Edmond Halley* by Richard Phillips, c. 1721. The National Portrait Gallery, London.

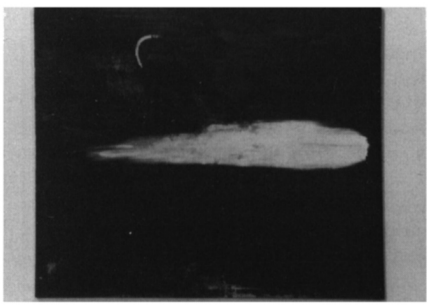

Fig. 41 Rudolf Brammer, *Rendezvous with Halley's Comet in 1986*, 1982. Planetarium der Landeshauptstadt, Stuttgart.

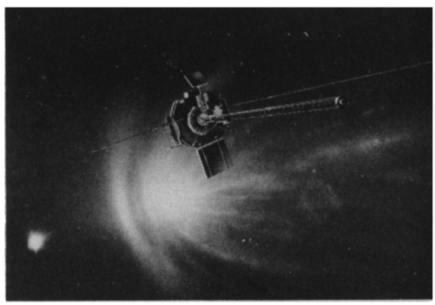

Fig. 42 Sigmar Polke, *The Comet.*, 1982. Private Collection, Cologne.

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Geldner, F. (1968) *Die deutschen Inkunabeldrucker*, I. A. Hiersemann, Stuttgart, ill. 68, 171). One of the texts he planned to publish was his *De Cometae magnitudine*, listed in the broadside but not published until 1530.

[6] Stevenson, E.L. (1921) *Terrestrial and Celestial Globes*, I, Yale University Press for the Hispanic Society of America, New Haven, 46-58.

[7] Stauber and Hartig, 105ff; 137-138; 153; 183; 207; 232; 240.

[8] The *Nuremberg Chronicle* is not the first history to include panoramic cityscapes, for very general, stylized views were included, for example, in editions of Rolevinck's *Fasciculus Temporum*, of which Schedel owned a copy (see Stauber and Hartig, 117; 203, who do not list an edition). The most topographically correct cityscapes in printed books of the fifteenth century were found in Bernhard von Breydenbach's *Peregrinatio in terram sanctam*, published in Mainz in 1486, with elaborate woodcuts by Erhard Reuwich. That Schedel owned a copy is documented by Stauber and Hartig, 166. See also Baer, 172-184, on the *Nuremberg Chronicle*.

[9] Pingré, A.G. (1783, 1784) *Cométographie*, L'Imprimerie Royale, Paris, 417-424; within the time bracket 1288-1304, he also records comets in 1293/94, 1296, 1297, 1300, and 1301 (2) including P/Halley, as well as ones in 1302, 1303, and 1304. See also Hasegawa, I. (1980) 'Catalogue of Ancient and Naked-Eye Comets', *Vistas in Astronomy*, 24, 80. For the comet of 1299, see Marsden, B.G. (1986) *Catalogue of Cometary Orbits*, International Astronomical Union, Cambridge, MA, 8 and 45; Ho Peng Yoke (1962) 'Ancient and Medieval Observations of Comets and Novae in Chinese Sources,' *Vistas in Astronomy*, 5, 194-195, who also notes comets in 1297 (2), 1299 (2), 1304 (2), as well as P/Halley in 1301; Kronk, G. W. (1984) *Comets: A Descriptive Catalogue*, Enslow Publishers, Hillside, N.J., 4-5; and Vsekhsvyatskii, S.K. (1964) *Physical Characteristics of Comets*, Israel Program for Scientific Translations, Jerusalem, 93, 98, who also lists P/Halley in 1301.

[10] Mucke, H., and Meeus, J. (1983) *Canon of Solar Eclipses*, Astronomisches Büro, Vienna, 784. Meeus, J., and Mucke, H. (1979) *Canon of Lunar Eclipses*, Astronomisches Büro, Vienna, 145, list five lunar eclipses for 684-685, but four of these were during European daylight and the fifth was penumbral, and thus none would have been visible in Europe.

[11] For P/Halley in 684, see Ho Peng Yoke, 170 (who also cites comets in 681 and 683); Marsden, 8 and 45; Vsekhsvyatskii, 93; Schove, D.J. (1984) *Chronology of Eclipses and Comets AD 1-1000*, The Boydell Press, Woodbridge, Suffolk, 293. Pingré, 333-334, who does not cite the *Chronicle* as a source, lists two comets in 684 (although the passage at the top of p. 334 may be interpreted as a third), perhaps the same comet before and after perihelion. Hasegawa, 72, lists three comets in 684 (possibly the result of his reading of Pingré), as well as ones in 687 and 693. See also Olson, R.J.M., and Pasachoff, J.M. (1987) 'New information on comet P/Halley as depicted by Giotto di Bondone and other Western artists,' *Astronomy and Astrophysics*, 187, 1-11 (also available as Grewing, M., Praderie, F., Reinhard, R., eds. [1988] *Exploration of Halley's Comet*, Springer Verlag, Berlin, 1-11).

[12] Wilson (1976), 46-47, discusses the surviving documents and the evidence of an earlier contract in 1487, indicating that the book was begun earlier and that the production time was longer. For the contract of December 29, 1491, see pp. 50-52.

[13] Roeder, J.P. (1742) 'Catalogus librorum qui saeculo XV A.C.N. Norimbergae impressi sunt,' Nuremberg, n.p.; see also Gümbel, A. (1902) 'Die Verträge über die Illustrierung

Geldner, F. (1968) *Die deutschen Inkunabeldrucker*, I. A. Hiersemann, Stuttgart, ill. 68, 171). One of the texts he planned to publish was his *De Cometae magnitudine*, listed in the broadside but not published until 1530.

[6] Stevenson, E.L. (1921) *Terrestrial and Celestial Globes*, I, Yale University Press for the Hispanic Society of America, New Haven, 46-58.

[7] Stauber and Hartig, 105ff; 137-138; 153; 183; 207; 232; 240.

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und den Druck der Schedelschen Weltchronik,' *Repertorium für Kunstwissenschaft*, 25, 430-437.

[14] Wilson, A. (1975) 'The Early Drawings for the Nuremberg Chronicle,' *Master Drawings*, 13, 115-130. Wilson mistakenly identified eight rather than five leaves; we have confirmed the existence of only five. They are inventoried in Solg. 68 (V, VI, IX, XI) and Solg. 69 (X) in the Nuremberg Stadtbibliothek.

[15] *Ibid.*, 115-130, and Wilson (1976), 60-61, 76, 193-205. Panofsky, E. (1948) *Albrecht Dürer*, I, Princeton University Press, Princeton, 19*ff*, states: "It is even possible and, I think not improbable that young Dürer was allowed to participate in a small way...." See also volume II, 52-53.

[16] Perhaps it was a mistake by the *formschneider*, but a prophetic one at that.

[17] Durrer, R., and Hilber, P., eds. (1932) *Diebold Schilling: Luzerner Bildchronik*, Genf: Sadag s.a., Geneva, folio LXIv.

[18] *Ibid.*, fol. CLVIIr.

[19] See Baer, XX-XXIV, for a listing of the several later editions with comets, beginning in 1481. For example, the 1490 edition, published in Strassburg by Johann Pryss, contains one of these small, thumbnail comet illustrations (folio LIIr) printed from a rather crudely carved woodcut.

[20] See Dall'Olmo, U. 'Latin Terminology Relating to Aurorae, Comets, Meteors and Novae,' *Journal for the History of Astronomy*, 11, 11-27; Massing, J.-M. (1977) 'A Sixteenth-Century Illustrated Treatise on Comets,' *Journal of the Warburg and Courtauld Institutes*, 40, 318-322.

[21] See Hess, W. (1910-1911) 'Himmels- und Naturerscheinungen in Einblattdrucken des XV.-XVIII Jahrhunderts,' *Zeitschrift für Bücherfreunde*, 2, 353-404; Geisberg, M. (1974) *The German Single-Leaf Woodcut 1500-1550*, 4 vols., Hacker Art Books, Inc., New York; Strauss, W.L. (1975) *The German Single-Leaf Woodcut 1550-1600*, 2 vols., Abaris Books, Inc., New York; and Alexander, D., and Strauss, W.L. (1977) *The German Single-Leaf Woodcut 1600-1700*, 3 vols., Abaris Books, Inc., New York.

[22] Véron, P., and Tammann, G.A. (1979) 'Astronomical broadsheets and their scientific significance,' *Endeavour*, 3, 160. The authors believe that the earliest cometary broadsheet dates from 1531, the year of Halley's Comet. See Alexander and Strauss, I, 20-21, for an interesting table analyzing the subject matter of single-leaf woodcuts between 1550-1600 and 1600-1700.

[23] *Ibid.*, 164.

[24] Strauss, III, 1344, and Hess, 400. See also G. Leidinger, *Einzel-Holzschnitte des Fünfzehnten Jahrhunderts* (Heitz und Schrieber, XXI-XXX), II, J.H. Ed. Heitz (Heitz und Mündel), Strassburg, 1926, 38, no. 65 (as well as Heitz und Schrieber, LXXXI-XC, no. 28).

[25] Hess, 395-396; who also lists the 1492 broadside by Sebastian Brant of the meteor that fell to earth at Ensisheim in 1492; see also Stauber and Hartig, 160, 161, 171, 173, 191ff.

[26] Hess, 395-396, ill. 29.

27 Hellman, G. (1921) "Die Meterologie im den deutschen Flugschriften und Flugblättern des 16. Jahrhunderts," *Abhandlungen der Preussischen Akademie der Wissenschaften*, Physikalisch-mathematische Klasse, Berlin.

28 Strauss, II, 648.

29 *Ibid.*, II, 480.

30 *Ibid.*, II, 939. Strauss, III, 937. Schultes attempted to establish a periodical newspaper, but the project did not succeed until after his death. In 1625, Lucas Schultes (probably a son) issued the first Bavarian biweekly newspaper in Oettingen (between Augsburg and Nuremburg).

31 *Ibid.*, II, 879.

32 Robinson, J.H. (1916) *The Great Comet of 1680: A Study in the History of Rationalism*, Press of the Northfield News, Northfield, Minnesota. See also Olson, R.J.M. (1988) "The Comet of 1680 in Dutch Art," *Sky and Telescope*, 76, 706-708.

33 Véron and Tammann, 163-164.

34 Alexander and Strauss, I, 53.

35 Véron and Tammann, 164.