PAVING THE WAY WITH SNIPPETS
PASTING AS A METHOD OF INNOVATION AND AUTOMATION IN THE ROUTE SCROLLS OF AUGUST, ELECTOR OF SAXONY

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Introduction

In the years around 1575, Elector August of Saxony (1526–1586) produced six route maps on which he recorded journeys he had undertaken. They represent the routes from Annaburg to Schwerin (scale 1:27 000), from Belzig to Havelberg (1:30 500), from Schwerin to Torgau (1:22 500), from Dresden to Letzlingen (o.A.), from Mühlberg to Regensburg (1:35 500) and from Regensburg to Augustusburg (1:30 500).[1] It is not known exactly when and for what reasons August undertook these journeys. Only the travels recorded in the last two route scrolls can be proven and dated, as they chart August's outward and return journey to the Electors' Convention in Regensburg in 1575.

The route scrolls consist of strips of paper or parchment about 10 centimetres wide and of varying lengths, from about 3.7 metres to over 19 metres **(Fig. 1)**. The strips are rolled up on wooden spools and kept in

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1 The route scrolls are digitally accessible at www.deutschefotothek.de. Their signatures at the SLUB Dresden are: Mscr. Dresd.L.456, Mscr.Dresd.L.455, Mscr. Dresd.L.453, Mscr.Dresd.L.452, Mscr. Dresd.L.451, Mscr.Dresd.L.454. They were already listed in the first inventory of the Dresden Kunstkammer. On the inventory, see Martina Minning, "Das Inventar der kurfürstlich-sächsischen Kunskammer von 1587, zur Einführung", in *Die kurfürstlich-sächsische Kunstkammer in Dresden. Das Inventar von 1587*, ed. Dirk Syndram, Martina Minning and Jochen Vötsch, Dresden 2010, n.p.

Fig. 1
Elector August of Saxony / Heinrich Göding /
Friedrich Bercht, Route Scroll of the Journey
from Mühlberg to Regensburg, 1575, pen and
ink drawing and pasted vignettes on vellum,
1 336 × 10.5 cm. Saxon State Library – Dresden
State and University Library (SLUB), Manuscript
Collection, call number: Mscr.Dresd.L.451
(photo: Margot Schaal)

Fig. 2
Elector August of Saxony / Heinrich Göding /
Friedrich Bercht, Route Scroll of the Journey
from Mühlberg to Regensburg, 1575, pen and
ink drawing and pasted vignettes on vellum,
1 336 × 10.5 cm, Saxon State Library – Dresden
State and University Library (SLUB), Manuscript
Collection, Mscr.Dresd.L.451 (photo: Regine
Richter)

cardboard sleeves **(Fig. 2)**. In the centre of each strip, the route taken is drawn in ink as a simple line. Changes in direction are indicated by compass roses, glued on at different angles to signal the corresponding compass bearing **(Fig. 3)**. Landscape elements are added in the form of glued-on snippets of paper imprinted with pictures: the route leads past villages, towns and country estates, over bridges and through forests **(Fig. 4)**. Place names are handwritten, and rivers and streams drawn on, in pen.

The route scrolls are the product of Elector August's intensive involvement with geodesy and cartography and his great interest in surveying technology and instruments, evidenced not only in the large cartographic projects that he commissioned, but also in mapping operations which he carried out himself.[2] The Saxon court's interest in geodesy and cartography aligned with a European trend: as Richard L. Kagan and Benjamin Schmidt summarise, an increasingly territorial understanding of rule became established in the modern era, with rule over land replacing rule over people. In the course of this "rise of territorial consciousness", knowledge about space became an essential constituent of power.[3] At the courts, mathematics, surveying and geography became subjects of princely education and expertise in these areas was encouraged. The study of mathematics, instrument making, land surveying and cartography had practical political functions of a military and economic nature, since they were relevant to warfare and territorial expansion, military security and fortress construction as well as to the economic use of land and resources, the stipulations of forestry rights, taxes and transport routes.[4] At the Electoral Court in

2 Among August's most remarkable carto-graphic commissions are the "Duringische und Meisnische Landtaffel" by Hiob Magdeburg, 1566, and the forest maps by Georg Öder the Younger between 1554 and 1571. Regarding August's own cartographic productions, the "16 kleine Landtafeln" from the year 1584 are best known. See Wolfram Dolz, "Kurfürst August als Geodät und Kartograph", in *Fürstliche Koordinaten. Landesvermessung und Herrschaftsvisualisierung um 1600*, ed. Ingrid Baumgärtner, Leipzig 2014, pp. 69–86; Ludwig Schmidt, *Kurfürst August von Sachsen als Geograph,* Dresden 1898*; Kursächsische Kartographie bis zum Dreißigjährigen Krieg*, ed. Fritz Bönisch, Berlin 1990, 214–217

u. 228–229; Axelle Chassagnette, *Savoir géographique et cartographie dans l'espace germanique protestant (1520–1620)*, Geneva 2009, pp. 386–388.

3 Richard L. Kagan and Benjamin Schmidt, "Maps and the Early Modern State. Official Cartography", in *The History of Cartography*, 6 vols., Chicago et al. 1987–, vol. 3: Cartography in the European Renaissance, ed. David Woodward, 2007, Part 1, pp. 661–679, pp. 662–665, quotation p. 663.

4 Bruce T. Moran, "German Prince-Practitioners. Aspects in the Development of Courtly Science, Technology, and Procedures in the Renaissance", *Technology and Culture*, 22 (1981), p. 253, p. 259.
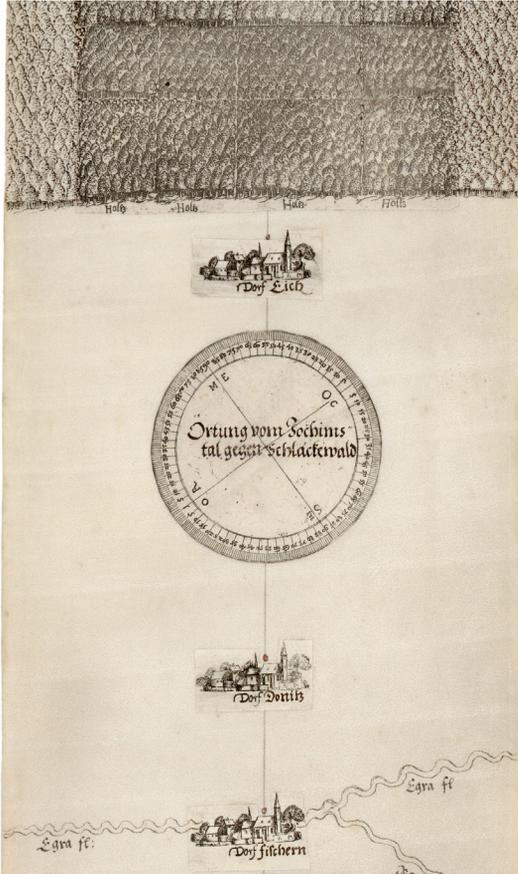
Fig. 3
Detail from: Elector August of Saxony /
Heinrich Göding / Friedrich Bercht, Route
Scroll of the Journey from Mühlberg to
Regensburg, 1575, pen and ink drawing and
pasted vignettes on vellum, 1 336 × 10.5 cm,
Saxon State Library – Dresden State and
University Library (SLUB), Manuscript
Collection, Mscr.Dresd.L.451
(photo: © SLUB Dresden / Deutsche
Fotothek)

Fig. 4
Detail from: Elector August of Saxony /
Heinrich Göding / Friedrich Bercht, Route
Scroll of the Journey from Annaburg to
Schwerin, ca. 1575, pasted vignettes and pen
and ink drawing on paper, 1 030 × 10.5 cm,
Saxon State Library – Dresden State and
University Library (SLUB), Manuscript
Collection, Mscr.Dresd.L.456
(photo: © SLUB Dresden / Deutsche
Fotothek)

Fig. 5
Detail from: Elector August of Saxony /
Heinrich Göding / Friedrich Bercht, Route
Scroll of the Journey from Dresden to
Letzlingen (Nötzlingen), ca. 1575, pasted
vignettes and pen and ink drawing on
paper, Saxon State Library – Dresden State
and University Library (SLUB), Manuscript
Collection, Mscr.Dresd.L.452
(photo: © SLUB Dresden / Deutsche
Fotothek)
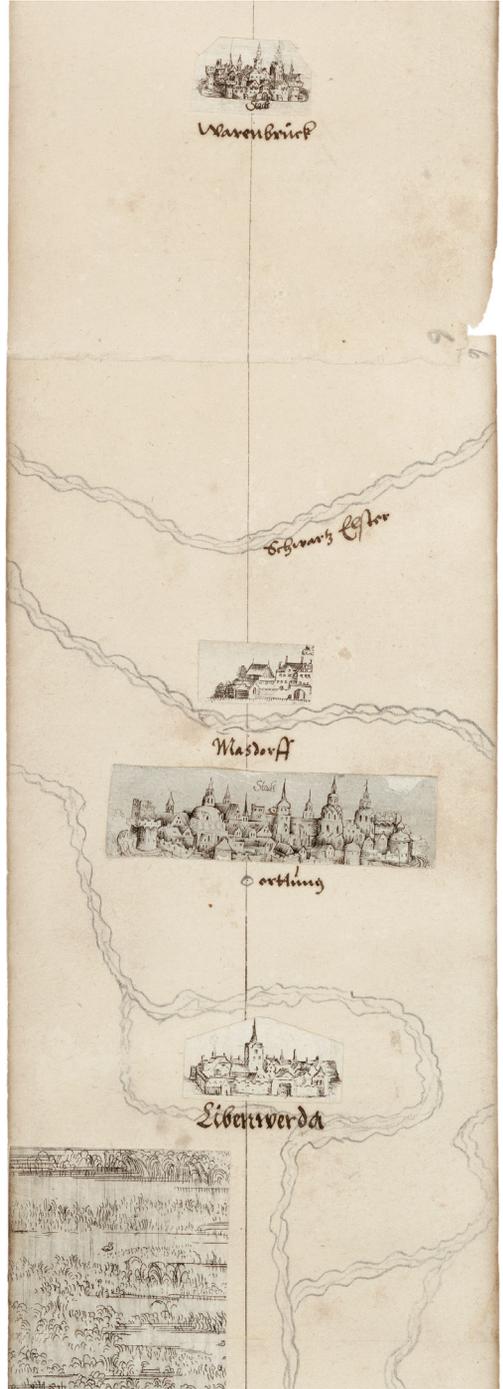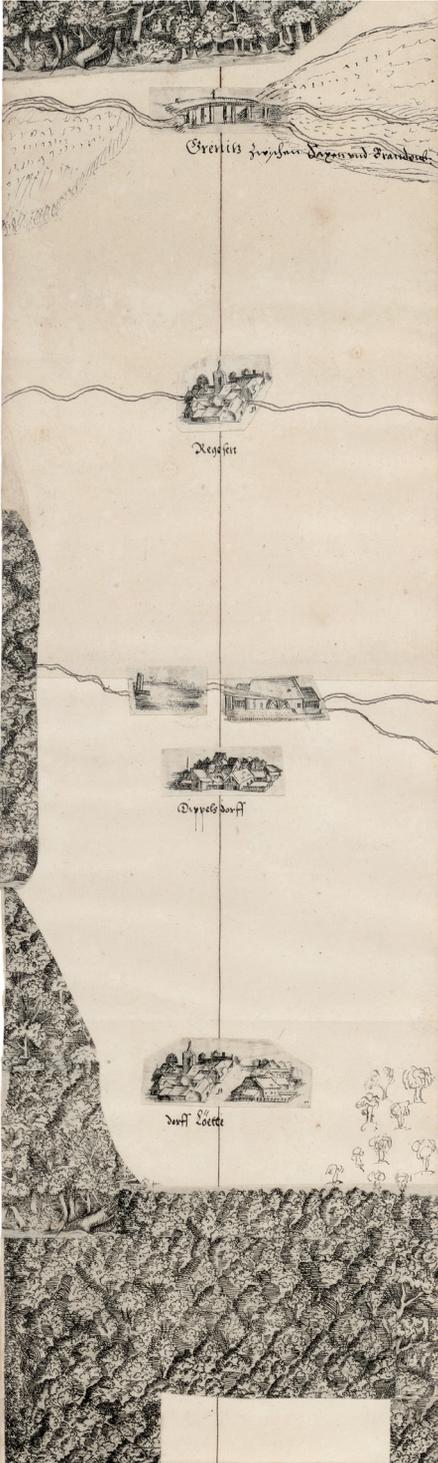
Dresden under August, interest in surveying and cartography was particularly strong, not least because Saxony's prosperity depended on mining, the use of waterpower and forestry.[5]

Numerous sources on the cartographic projects in early modern Saxony were made accessible in Sophus Ruge's 1881 *Geschichte der sächsischen Kartographie im 16. Jahrhundert* (History of Saxon Cartography in the 16th Century), a study on which much of the historical research in this field continues to draw today. In the context of the recent growing interest in early modern collections, Elector August's geodetic and cartographic activities have also been examined more specifically within the material framework of the Kunstkammer in Dresden. Its particular and – compared to other princely collections – unusual focus was on tools and scientific instruments, which accounted for about eighty percent of the collection.[6] The centrepiece of the seven rooms was the so-called "Reißgemach". The name itself indicates the central role played by the activity of drawing (*Reißen*) plans (*Risse*) here.[7] In the first inventory of the collection, compiled in 1587, shortly after August's death, the entries for this room begin with the "beautiful artful writing tables" ("schönen kunstreichen schreibetischen") and "writing instruments" ("schreib zeugen")[8] which were located there. All the other rooms also contained desks, writing and drawing tools,[9] indicating that an important function of the *Kunstkammer* was to produce records, plans and sketches. It was in this spatial and intellectual

5 Chassagnette 2009 (note 3), pp. 374–376.

6 Joachim Menzhausen, "Elector August's Kunstkammer. An Analysis of the Inventory of 1587", in *The Origins of Museums. The Cabinet of Curiosities in 16th and 17th century Europe*, ed. Oliver Impey and Arthur MacGregor, Oxford 1985, pp. 69–75; Peter Plaßmeyer, "Christoph Schissler: The Elector's Dealer", in *European Collections of Scientific Instruments, 1550–1750*, ed. Giorgio Strano, et al., Leiden 2009, pp. 15–25, p. 16. The Dresden Kunstkammer was founded by Elector August, whose interest in innovative instruments ca be traced back to the 1550s. It is mentioned for the first time in official documents from the year 1572. See Minning 2010 (note 1).

7 The original meaning of "reiszen" or "reißen" was to write, but in the early modern period, its meaning narrowed down to refer to drawing, etching etc. See, *Deutsches Wörterbuch*, ed. Jacob Grimm and Wilhelm Grimm (1852–1961), digital edition, URL: https://woerterbuchnetz.de/?sigle=DWB#2 (accessed 12.04.2023), vol. 14, columns 754–755.

8 Syndram, Minning and Vötsch (ed.) 2010 (note 1), fol. 5r.

9 Among them were reduction measuring rods, angles and rulers as well as drawing instruments ("Reißzeug"). See Klaus Schillinger, *Zeicheninstrumente. Katalog: Staatlicher Mathematisch-Physikalischer Salon Dresden Zwinger*, Dresden 1990.

context that Elector August made and stored his route scrolls.[10] The inventory registers all of them individually and records them as "voyages" ("Reisen") without specifying their format, appearance or conception. All six recorded scrolls have been preserved and can be identified because the entries include the individual points of departure and the destinations, e.g. "Reise von der Annaburgk nach Schwerin".[11]

If we take a closer look at the way the route scrolls were made, gluing proves to be an essential element. The narrow strips of paper or parchment that form the base are made up of several strips glued together **(Fig. 5)**. The topographies drawn on them are composed of small printed images of landscape elements that had been cut out and glued onto the long strips of supporting material. Pre-printed pictures of forests, city views, ponds, bridges, mills, houses, castles, etc. were combined in this way to form individual topographic images. This method of manufacturing maps by gluing pieces together is unique and will form the starting point of the following investigation. The study will show that gluing was a means to implement and to demonstrate innovation and automation in mapping processes.

Characteristics of route maps

The route scrolls are representations of the Elector's travel routes. In her seminal article *Milieus of Mobility: Itinieraries, Route Maps, and Road Maps*, Catherine Delano-Smith defines the concept of a route as follows: "[A]route is not a road, nor in itself a physical feature, but a direction, an imaginary line linking a point of departure with a destination. Only its description gives it tangible form in speech or gesture, writing or image. A route may relate to a journey already undertaken or to one in the future."[12] This is exactly what the route scrolls do. They document the movement of Elector August from a starting point to a destination, recording details such as the course of the journey, stopovers and various features of the

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10 According to Wolfram Dolz, the measuring as well as the route scrolls were done by the Elector himself. Wolfram Dolz, "Kurfürst August von Sachsen (1553–1586) als Vermesser und Kartograph", *Dresdener Kunstblätter*, 51 (2007), pp. 25–35, p. 30.

11 Syndram, Minning and Vötsch (ed.) 2010 (note 1), fol. 75r.

12 Catherine Delano-Smith, "Milieus of Mobility. Itineraries, Route Maps, and Road Maps", in *Cartographies of Travel and Navigation*, ed. James R. Akerman, Chicago 2006, pp. 16–68, p. 32.

places passed, whilst omitting others, e.g. information on the condition of the roads or on altitude. The scrolls record the routes in a graphically elaborate manner and can be seen as posterior medial addenda to the journeys already undertaken, since they are based on data collected during the journeys themselves, as will be explained in more detail below.

It is likely that the routes had already been described in other media in advance of the Elector's journeys. The journeys were probably planned on the basis of road books, itinerary collections, distance tables or other, including non-written, knowledge sources, and noted down in the form of itineraries. Itineraries, simple lists of place names in the order of travel, had been a common means of describing routes since antiquity. Sometimes they also contained additional information, such as distances and accommodation facilities. In order to find their way to the next place on the list, travellers had to rely on signposts and oral communication. Itineraries remained the principal medium for planning and orientation on journeys in Europe until the 19th century.[13]

The elaborate design of Elector August's route scrolls is very unusual for the recording of journeys, and examples of similar, visually enhanced route representations are rare. The few existing examples suggest that route maps were not made to provide information for wayfinding purposes, but rather fulfilled other functions. One such example are the maps made by the monk Matthew Paris, who lived in the British Benedictine monastery of St. Albans in Hertfordshire from 1217 until his death in 1259. They are part of a monastic chronicle written by Paris and show the route from London via Rome to the port cities of southern Italy, followed by a map of the Holy Land.[14] The route is marked as a line on wider strips that are to be read vertically **(Fig. 6)**, and usually number four to a page. Important landmarks such as towns, monasteries, etc. are represented along the line in the form of small drawings. Another example of a pictorial route map is John Ogilby's road atlas *Britannia*, which first appeared in

13 Delano-Smith 2006 (note 12), 34–46, 57. In the 19th century, maps came to be used as wayfinding aids.

14 Matthew Paris, *Chronica majora*, ca. 1250, Corpus Christi College, Cambridge, ms 26.

1675 and was later republished in various versions. In Ogilby's work, too, the roads are arranged in the form of several vertical strips placed side by side on the pages of a book, except that in this case they are illusionistically depicted as strips of paper with tears and curled ends **(Fig. 7)**. Compass roses indicate the compass bearing and settlements, towns, rivers and other landmarks are mapped. Researchers have recently argued in connection with both examples that, contrary to earlier assumptions, they were not intended for orientation purposes on actual journeys.[15] With regard to Matthew Paris's maps, it has convincingly been suggested that they served as a meditative medium which allowed the monks in St. Albans to undertake a mental pilgrimage to Rome or Jerusalem.[16] Ogilby's road maps, it is argued, especially given that they were published in a very large, heavy volume, served a representative function of visually demonstrating England's prosperity and infrastructure to their readers.[17]

In view of these examples of graphically elaborated route maps, it seems reasonable to assume that Elector August's route scrolls were not intended for practical use in planning and carrying out journeys; rather their function must be determined differently. Their production demanded a remarkable amount of effort. This is related to the function of the route scrolls themselves, which, as will be argued in the following, lay in the testing, application and further development of surveying technologies, from data collection to the method of representation, and in their execution with the help of gluing.

15 In older literature, it is assumed that route maps were used as means of wayfinding. See e.g. Gregory Johnson, "The Evolution, Application and Implications of Strip Format Travel Maps", *The Cartographic Journal*, 24 (1987), pp. 147–158.

16 Daniel K. Connolly, "Imagined Pilgrimage in the Itinerary Maps of Matthew Paris", *The Art Bulletin*, 81 (1999), pp. 598–622.

17 Delano-Smith 2006 (note 12), pp. 50–54; Gordon C. Dickinson, *Britannia's roads. An introduction to the strip maps of John Ogilby's Britannia, 1675*, Leeds 2019, pp. 12–13.

Fig. 6
Matthew Paris, detail of the map of the
route from London to Naples, in Matthew
Paris, Chronica maiora I, ca. 1200–1299,
ca. 26 × 19.5 cm, Cambridge, Corpus Christi
College, MS 026, f. iiv

Fig. 7
John Ogilby, The continuum of the road from
London to Frambrugh, in Britannia, volume
the first [...] By John Ogilby, Esqr; his Majesty's
Cosmographer, etc., London 1675, British Library,
C.6.d.8., pl. 42

Automation and technology in surveying instruments at the Dresden court

The route scrolls serve not only as a document of August's travel itineraries, but also of his geodetic skills. August seems to have understood and used his journeys, such as those to and from the Electors' Convention, as opportunities to carry out land surveys, i.e. to use his instruments, to test their functions and to record data. The act of surveying itself can be seen as a confirmation of the Elector's claim to power, as Barbara Marx notes, as he thereby performed the "meticulous penetration and control of a dominion territory".[18] This was also part and parcel of August's *Kunstkammer* collection, which included numerous precious, representative

18 Barbara Marx, "Ergreifen, Begreifen. Das Reißgemach des Kurfürsten August in der Kurfürstlichen Kunstkammer im Residenzschloss Dresden", in *Fürstliche Koordinaten. Landesvermessung und Herrschaftsvisualisierung um 1600*, ed. Ingrid Baumgärtner in Zusammenarbeit mit Lena Thiel, Leipzig 2014, pp. 31–68, p. 67. (Original German: "minutiöse[n] Durchdringung und Kontrolle eines Herrschaftsterritoriums").

surveying instruments. The Elector himself collaborated with eminent scholars on technical improvements, showing particular interest in automating processes and in consolidating multiple individual operations into a single process.[19] A step towards simplified distance measurement was enabled by the change from measuring chains and rods to odometers, which registered wheel rotations or steps and could be used when travelling in a carriage as well as on foot or horseback.[20] Over the years, the Elector repeatedly commissioned improved odometers from instrument makers based in centres such as Augsburg and Leipzig or employed directly at Court. The *Kunstkammer* inventory of 1587 lists a total of twelve odometers from August's possessions.[21] Most of them could be installed directly in the Elector's carriage and connected to one of the carriage wheels.

The idea of integrating a recording function into the surveying apparatus also played a role from early on. In 1564, August wrote to the Leipzig-based mathematics professor Valerius Tau (1531–1575) that Tau's suggestion to have an automatic odometer built for his carriage appealed to him, yet he also wished that he could use the device to "not only measure distances and changes of direction while driving, but also to accurately record them according to their geographic situation and to bring them into a certain delineation".[22] In doing so, it was August himself who articulated the objective of integrating a technical system into the carriage odometer, which would record the route graphically. An odometer designed by the instrument maker Thomas Rückert from Dresden, which can be dated to around 1575, fulfilled such a function **(Fig. 8)**.[23] Here, compass

19 Marx 2014 (note 18), pp. 64–65; Schmidt 1898 (note 2), pp. 9–10; Dolz 2007 (note 10), p. 26.

20 See Uta Lindgren, "Land Surveys, Instruments, and Practitioners in the Renaissance", in *The History of Cartography*, 6 vols., Chicago et al. 1987–, vol. 3: Cartography in the European Renaissance, ed. David Woodward, 2007, Part 1, pp. 477–508, p. 490. Ropes, chains and poles of a certain length were used for measuring distances in the field. However, due to the sag, ropes and chains were prone to produce false results. The odometer (from the Greek οδός = road and μέτρον = measure) is a measuring

wheel with a certain circumference. By registering the number of rotations, it enables the user to calculate distances.

21 Plaßmeyer 2009 (note 6), p. 23.

22 Original German: "im fahren nit allein messen sondern auch irer gelegenheit nach rechtschaffen deliniiren und in einen gewissen riss bringen konte." Quoted from: Schmidt 1898 (note 2), p. 9.

23 Wolfram Dolz, "Kurfürst Augusts Wegmesser und Reiseroutenrollen", in *Genau messen=Herrschaft verorten. Das Reißgemach von Kurfürst August, ein Zentrum der Geodäsie und Kartographie*, ed. Wolfram Dolz and Yvonne Fritz, Berlin 2010, pp. 44–53, pp. 46–48.

Fig. 8
Thomas Rückert, Waywiser, 1575,
brass (cast, etched, gilded), iron, case:
11 cm (diameter) × 6.3 cm (depth), base: 7.1
cm (width) × 9.5 cm (depth), V 443
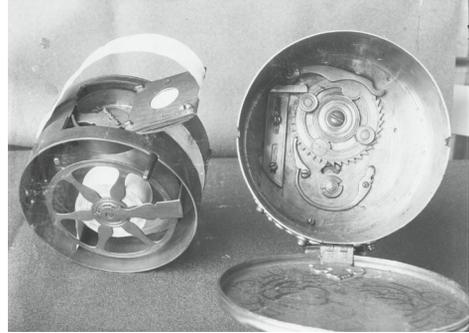(photo: GRASSI Museum für Angewandte
Kunst, Leipzig)

Fig. 9
Thomas Rückert, Waywiser, 1575,
brass (cast, etched, gilded), iron, case:
11 cm (diameter) × 6.3 cm (depth), base:
7.1 cm (width) × 9.5 cm (depth), GRASSI
Museum, Leipzig, V 443 (opened)
(photo: GRASSI Museum für Angewandte
Kunst, Leipzig.)

readings, i.e. directional information, are mechanically imprinted on a
paper strip that is rolled out automatically by the measuring mechanism
while the carriage is in motion **(Fig. 9)**.

However, the instruments that August probably used during his journey
to the Electors' Convention in Regensburg did not yet have an automatic
recording function.[24] The Elector noted the distances he measured and
his compass readings by hand, as shown by the preserved survey list of

24 These were an odometer produced by
an unknown manufacturer (Sächsische
Kunstsammlungen Dresden, Mathema-
tisch-Physikalischer Salon, Inv. C III a 1)
and a nautical compass with gimbal,
dated around 1560 (Sächsische Kunst-
sammlungen Dresden, Mathematisch-
Physikalischer Salon, Inv. C VI 2). See
Dolz 2014 (note 2), pp. 74–77.

Fig. 10
Elector August of Saxony, Von der Augustus-
burck auf den Annaburck den 27 Septembris
1575, manuscript, Sächsisches Staatsarchiv,
Hauptstaatsarchiv Dresden, 10024 Geheimer
Rat (Geheimes Archiv), Loc. 09762/04, Bl. 13

Fig. 11
Christoph Trechsler, Waywiser,
1584, brass (gilded, etched, engraved,
punched), steel, total height 42 cm,
total depth 38.5 cm, Staatliche
Kunstsammlungen Dresden,
Mathematisch-Physikalischer Salon,
C III a 4

the routes from Augustusburg to Regensburg and from Regensburg back
to Augustusburg **(Fig. 10)**. The list records the distances covered each
day, subdivided into numerous intermediate sections, with the distances
given in rods ("Ruten").[25] August subsequently translated the notes he
made during his journeys into a coherent graphic format on the route
scrolls. In doing so, he transformed his measurement results into impres-
sive and entertaining *Kunstkammer* objects that may well have been shown
to high-ranking guests. The unique shape of the scrolls, which had to be
handled in an unusual way, added to their appeal.

In the following years, August worked on developing his surveying in-
struments, overseeing the incorporation of additional functions. August's
best-known waywiser, designed by Christoph Trechsler in 1584, not only
measured travelled distances particularly reliably; it also indicated the
direction of movement using an in-built compass **(Fig. 11)**, and marked

[25] Survey list of August's journey to the
Electors' Convention in Regensburg 1575,
Sächsisches Staatsarchiv, Hauptstaats-
archiv Dresden, 10024 Geheimer Rat
(Geheimes Archiv), Loc. 09762/04,
Bl. 13–33; see also Dolz 2014 (note 2),
p. 76.

both automatically on a continuous paper strip.[26] Unfortunately, the additional parts that made this function possible – "a plate with a winding device for a paper strip and with a small compass needle for marking the angles" as well as an "angle disc with alidade, with the help of which one could determine the numerical value of the angle by means of the compass points pressed in"[27] – were among the wartime losses of the Mathematisch-Physikalischer Salon. One component that did survive is the small drawing board integrated in this waywiser, in which a wooden plate covered with paper could be inserted.

The fragmentary remains of the *Kunstkammer's* historical collections make it impossible to judge how far the technical possibilities of recording measurements automatically practically extended at this time. For example, an odometer by Martin Feyhel (active in Augsburg 1577–1602) from around 1580/1585 was lost in the Second World War.[28] However, a short text by the Elector under the heading "What I can show and do with my newly invented instrument" gives an impression of its use. Here August emphasised in particular that the waywiser enabled exact orientation in unknown terrain and also mentioned that a map could be made directly en route with the help of the instrument: "[...] in this way the road can be observed by this instrument and what is on both sides as far as one can see ahead, towns, castles, water, passes, villages, mountains or woods or fields can all be made like a map in a single operation".[29] Unfortunately,

26 Wolfram Dolz, "The Waywisers of Elector Augustus of Saxony and their New Use in the Survey of Saxon Postal Roads", in *European Collections of Scientific Instruments, 1550–1750*, ed. Giorgio Strano et al., Leiden 2009, pp. 43–59, pp. 48–52.

27 Dolz 2007 (note 10), p. 29. Original German: "eine Platte mit einer Wickelvorrichtung für einen Papierstreifen mit kleiner Kompassnadel zum Markieren der Winkel"; "Winkelscheibe mit Alhidade, mit deren Hilfe man den Zahlenwert des Winkels an Hand der eingedrückten Kompasspunkte bestimmen konnte".

28 There is evidence that the Elector paid a sum of 200 Taler for this instrument in 1585. See Dolz 2010 (note 23), p. 47.

29 Original German: "[...] so kann durch dis instrument der weg observirt unnd was auff beiden seittenn so weit mann sehen kan vor stäte, schlösser, wasser, pässe, dorffer, gebirge oder ebent holtz oder felldt gelegen alles einer mappenn gleich in einem durchzuge gemacht werdenn." Elector August, "Was ich mit meinem neuwerfundenen Instrument zeigen unnd darthun kann", SLUB Dresden, Mscr. Dresd. K A 928 (= K.449). See Dolz 2014 (note 2), pp. 78–79; first published by Schmidt 1898 (note 2), pp. 10–11.

the extent to which the device's functions described here actually worked in practice and what the resulting maps looked like remains unclear, since no traces of its usage appear to have survived. Nevertheless, the tendency is clear: instruments were developed with the aim of automating and improving surveying techniques; this also included the integration of systems that enabled the immediate recording of measurements. Ultimately, the possibility of surveying and producing a detailed cartographic recording in one single process was devised.

In his continual efforts to improve surveying apparatuses, Augusts' aim was to integrate several functions (measuring distance and direction) as well as to automate the measuring process and cartographic recordings. The fact that automatic recording procedures were integrated into the odometers shows that surveying and its medial documentation formed one coherent effort.

Pasting as a method of innovation and automation in the production of maps

Even though the route scrolls were produced by hand in a separate work step, they are nevertheless characterised by the same demand for technical improvement, and can thus be seen as testing sites for geodesy and cartography at the Saxon court. The development of pre-printed landscape vignettes that could be cut and pasted to create the cartographic image can be understood under the same aspect that was pivotal for August's measuring instruments: automation. Gluing is an essential part of the technical enhancement of the medium, bringing with it several benefits: it makes it possible to maintain a certain qualitative standard of representation, while at the same time enabling fast and efficient work. In addition, the use of printed images remains visible in the final product, thus emphasising the technical control and advancement of the mapmaking process.

By commissioning the printed landscape elements from his court painters Friedrich Bercht and Heinrich Göding, August made sure that his cartographic efforts resulted in professional images of high quality. Immediately before setting out on his journey to the Electors' Convention

in Regensburg, in a letter dated 7 September 1575, August communicated his instructions for the artist Friedrich Bercht:

> L. G.! Our most gracious request and wish is that you commission our painter Friedrich Berchte of Dresden on our behalf, to engrave on a sheet of copper, estates, castles, fortresses, villages, forges, barns, taverns or inns, mills, busy waterways, common rivers, streams, ponds, woods, likewise a compass rose, divided into 90 parts, to be engraved in the most careful and subtle manner, so that one may inscribe under each, whatever it may be, and from the impressions one may cut off each without compromising the other. When such engravings are ready, you should prepare four imprints on paper used for books and send them to us in the most expedient manner ... Date Mulberg 7 Sept. anno 75.[30]

It would seem that Bercht carried out the order immediately, whereupon the Elector once again asked for modifications, for thirteen days later August wrote another letter, this time directly to Bercht:

> We have received the other copperplate engravings sent to us after the first lot, and we like them better than the first ones, therefore we request that you print more of the same copperplate engravings and send them to us together with the copperplate, in return for which we will order and present you with a tribute from our chamber in Dresden, [...]. Datum et supra [i.e. Mühlberg, 20 Sept. 1575].[31]

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30 Original German: "L. G.! Vnser gnädigstes begeren vnnd beuhelich ist du wolltest vnsern Mahler Friedrich Berchte zu Dresden von vnseretwegen beuhelen, Vff ein Kupferblech, Stedte, Schlösser, Merckte, Dorffer, forwerge, Scheffereien, Krüge oder Wirdtshäuser, Mühlen, Schiffreiche Wasser, Gemeine ströme, Beche, Teiche, Holz, desgleichen eine Compassscheibe, vff 90 getheilt, vfs gefugste vnd subtilste als sich leiden will, dermassen vnterschiedlich zu stechen, das vnter ein Jdes, was es sei, gezeichnet werde vnd man auss den Abdrücken ein Jdes sonderlich vnuerletzt des andern abschneiden könne. Wann solche Kupferstich fertig, wolltest du vonn vier Buch Pappier abdrücke machen lassen vnd vns förderlichst zufertigen ... Datum Mulberg den 7. Sept. Anno 75". Letter to

Barthel Stark, quoted in: Sophus Ruge, *Geschichte der sächsischen Kartographie im 16. Jahrhundert*, Lahr 1881, p. 230. Ruge gives the following reference: Hauptstaatsarchiv Dresden, Cop. 404, fol. 215b.

31 Original German: "Wir haben die anderen nachgeschickten Kupferstich empfangen vnd haben vns dieselbigen besser dann die ersten gefallen, begehren derhalben, du wolltest vns derselben Kupferstich mehr drucken vnd sampt dem Kupferblat anhero schickenn, dargegen wollen wir dir eine Verehrung aus vnserer Cammer zu Dressden verordnen vnd geben lassen, [...]. Datum et supra [d. h. Mühlberg, 20. Sept. 1575]". Letter to Friedrich Bercht, quoted in Ruge 1881 (note 30), p. 230.

This process shows that August was just as concerned with improving the images as he was with the waywisers, in order to ensure the quality and functionality of the materials intended for his route maps. The map symbols could be reproduced easily, quickly and consistently and they were readily available in sufficient quantities, particularly since the Elector secured ownership of the printing plate for himself.

An unused, complete print of such landscape elements, though probably not by Bercht but by Heinrich Göding, is preserved in the Dresden Kupferstich-Kabinett **(Fig. 12)**.[32] This print provides an impression of the repertoire of motifs that the Elector had at his disposal when assembling the route scrolls. It contains villages, larger and smaller fortified towns, monasteries, various princely residences, transport ships, a raft, fish ponds, farm buildings and barns, water- and wind-powered mills, a blast furnace (?), a garden, a field, a vineyard, a bridge, a town featuring raised hills in the foreground (perhaps entrances to mining tunnels?), a watchtower, an elevated road and a place of execution. From the route scrolls themselves, we know that August used images of forests printed as patterns on larger surfaces, which allowed him to paste on expansive forested areas. In terms of a political iconography of landscape, this gives a fairly complete picture.[33] The pre-printed sheets provided compact iconographic abbreviations to mark relevant infrastructure, as well as political, legal, ecclesiastical institutions and economic features.[34] In contrast, larger geographic elements such as mountains are not mentioned in the wording of the commission, nor do they appear in Göding's sheet, or in the completed route scrolls. Instead, the landscape elements of the route scrolls reflect

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[32] See Andreas Dubslaff, "Soweit das Auge reicht – die Welt en miniature. Kurfürst August, Friedrich Bercht und Heinrich Göding d. Ä.", *Denkmalpflege in Sachsen. Mitteilungen des Landesamtes für Denkmalpflege Sachsen* (2016), pp. 43–51. Dubslaff argues that, due to the order made by August – mentioned above –, the print must have been made by Friedrich Bercht. This is not convincing, because for the route scroll of the journey to Regensburg, for which the order was given in the first place, another set of landscape vignettes was used.

[33] Martin Warnke, *Politische Landschaft. Zur Kunstgeschichte der Natur*, München et al. 1992.

[34] Compared to signs on printed maps, the small images were still quite complex, which accounts for the relatively rich visual representations of landscapes in the route scrolls. See for comparison Catherine Delano-Smith, "Signs on Printed Topographical Maps, ca. 1470– ca. 1640", in *The History of Cartography,* 6 vols., Chicago et al. 1987–, vol. 3: Cartography in the European Renaissance, ed. David Woodward, 2007, Part 1, pp. 528–590.
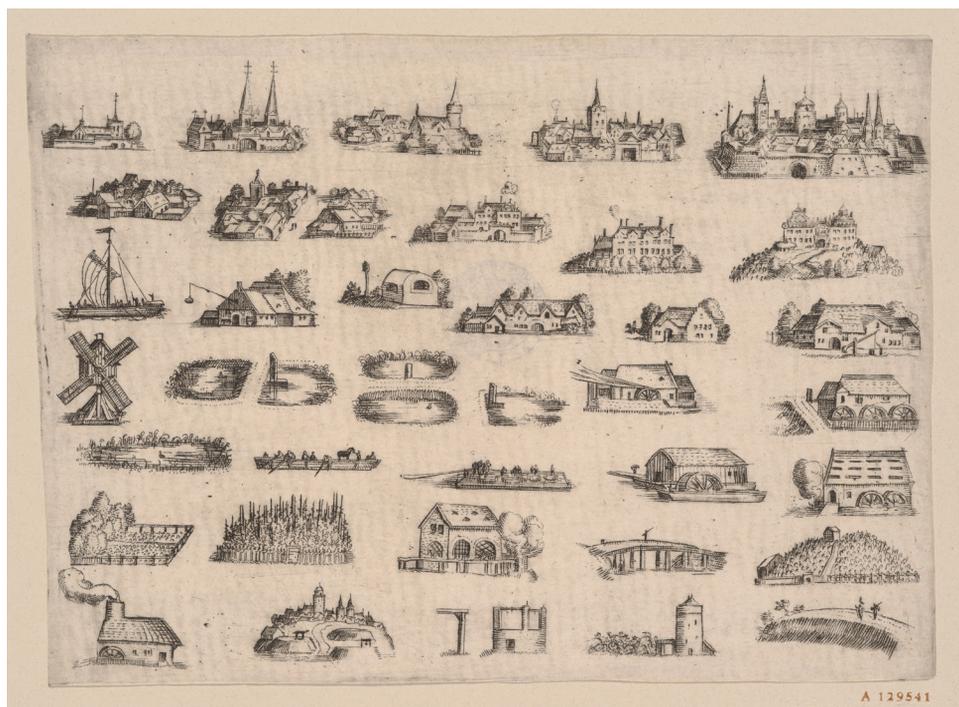
Fig. 12
Heinrich Göding, Various vignettes, 2nd half
of the 16th century (before 1586), etching,
13.5 × 18.6 cm, Staatliche Kunstsammlungen
Dresden, Kupferstich-Kabinett, Inv. A 129541
(photo: Andreas Diesend)

what was in close range, i.e., what could be precisely surveyed from the carriage en route. August's goal seems to have been to have at his disposal a comprehensive stock of high quality images suited to map the specific political landscape that he saw on his travels.

In addition, gluing made it possible for August to work with greater efficiency: the flexibility of using sets of pre-printed images made work easier, faster and generally more sophisticated than the drawing of landscape elements individually by hand. As becomes apparent when compared with other maps produced in the immediate environment at the Saxon court, the route scrolls follow the model of drawn maps in the formal design of the map symbols and landscape elements. For example, a map of

Oberheide and Sitzenroder Forest by the mining engineer and surveyor Georg Öder III, dated around 1570 and thus just a few years older than the route scrolls, is drawn entirely in ink and features small, unspecific village views identified by inscriptions **(Fig. 13a)**.[35] Formally, the village views as well as the drawing of the manor house in Sitzenroda **(Fig. 13 b** and **Fig. 13 c)** strongly resemble the printed vignettes used in the route scrolls **(Fig. 14)**. The etchings of landscape elements commissioned by August, it can be assumed, were based on this or similar drawn models. An intermediate stage between the completely hand-drawn map and the map made from pre-printed pieces can be discerned in an earlier route scroll made by the Elector that has not survived. The scholar Ludwig Schmidt referred to this scroll in 1898 as the "oldest one", noting that pieces of paper with hand-drawn landscape elements were pasted on the long paper strip.[36] According to Schmidt, "the journey Dresden – Grossenhain – Liebenwerda – Herzberg – Lochau – Mühlberg – Grossenhain" was recorded on it.[37] Even if it is no longer possible to examine how exactly this scroll was made, it can be concluded from the description that the map symbols were designed in advance by a draftsman and then cut out and glued on as required. The further development of this production principle with the creation of reproducible prints of landscape elements to be glued on can be understood as a rationalizing step in the interest of greater speed, efficiency and standardization. The use of technology was deliberately deployed and visibly emphasised on the medial level.

35 Georg Öder III., *Karte Oberheide und Sitzenroder Forst*, around 1570, Hauptstaatsarchiv Dresden, Schr. 6, F. 78, Nr. 6 (MF 18886).

36 Schmidt 1898 (note 2), p. 13. In contrast to the six route scrolls that this article deals with, this one belonged to the collections of the Mathematisch-Physikalischer Salon and was lost during an air raid in the Second World War. I thank Wolfram Dolz, curator at the Mathematisch-Physikalischer Salon, for this information.

37 Schmidt 1898 (note 2), p. 13. This scroll was possibly one of the "Compassortungen" that had been stored in the same tray as the route scrolls, according to the Inventory of 1587.

Fig. 13a–c
Georg Öder III, map of Oberheide and
Sitzenroder Forest, details, c. 1570,
Sächsisches Staatsarchiv, Hauptstaats-
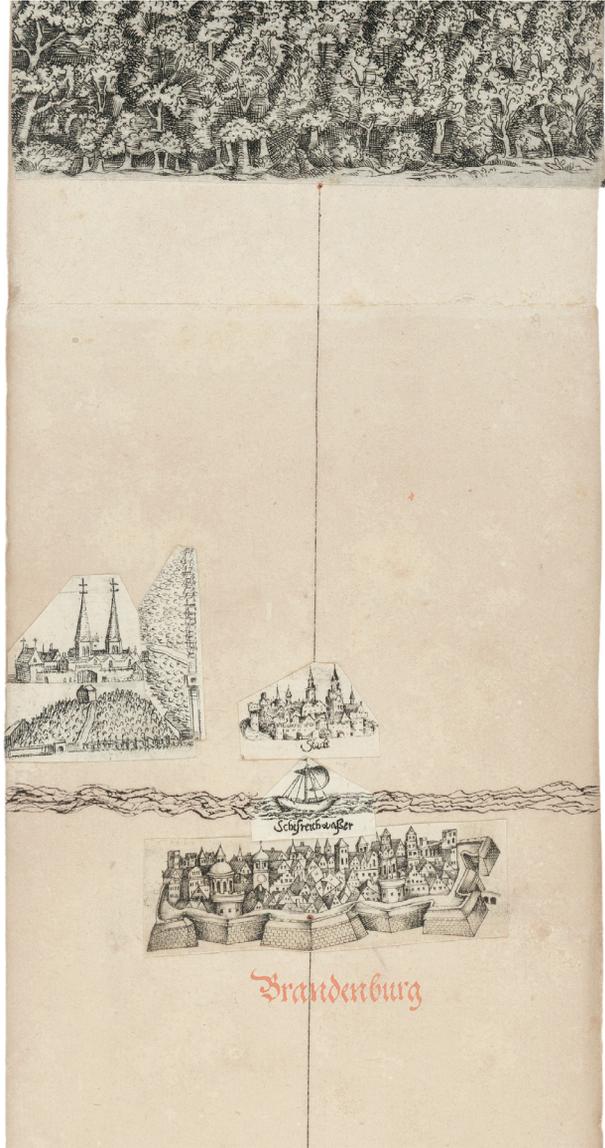archiv Dresden, Schr. 6, F. 78, No. 6
(MF 18886)

Fig. 14
Detail from: Elector August of Saxony / Heinrich
Göding / Friedrich Bercht, Route Scroll of the
Journey from Belzig to Havelberg, c. 1575, pen
and ink drawing and pasted vignettes on paper,
376 × 10.5 cm, Saxon State Library – Dresden
State and University Library (SLUB), Manuscript
Collection, call number: Mscr.Dresd.L.455
(photo: © SLUB Dresden / Deutsche Fotothek)

Conclusion

The route scrolls demonstrate by their design that the Elector had sovereign control over the technical processes, instruments and the human resources needed to develop them. This applied both to the surveying operations and to the production of the route scrolls. To assemble them, he made use of artists and instrument makers, odometers, printing presses, drawing tools, cutting instruments and glue. All this was part of the thematic orientation of the Electoral *Kunstkammer* towards technical processes, instruments and tools. The Elector's own handiwork, repeatedly mentioned and emphasised in the inventories of 1587 and 1595, is also significant in this context. The section of the 1587 inventory in which the route scrolls are listed indicates several times that August had made many of the maps himself.[38] The Elector's knowledge and skills can be understood as an elementary part of his reign with respect to his specific political agenda. In contrast to his brother Moritz, whom he had succeeded to the throne after the latter's death in 1553, August focused less on opportunities for influence in the Holy Roman Empire and more on administration and economy within Saxony. Knowledge of the territory was central to harnessing water power and maintaining control of forests. In addition, the art of mine surveying (*Markscheidekunst*), i.e. determining the boundaries and ownership of mines, was fundamental to the mining industry.[39]

Unlike the surveys and mappings of forests that August also carried out,[40] the route scrolls did not generate any directly useful knowledge about territories or economically relevant land that was pertinent to his reign. Rather, they are a by-product of the Elector's mobility – and perhaps for that very reason were suitable for testing and developing new surveying technology and new methods of medial representation. Nevertheless, the route scrolls hold a certain semantic value that results from their special

38 Syndram, Minning and Vötsch (ed.) 2010 (note 1), fol. 73r–fol. 75v. The title of this part is "Ahn allerley mappen und compaß ortungen".

39 Menzhausen 1985 (note 6); Peter Plaßmeyer, "'Churfürst August zu Sachßen etc. Seligen selbsten gemacht'. Weltmodelle und wissenschaftliche Instrumente in der Kunstkammer der sächsischen Kurfürsten August und Christian I.", in *Kunst und Repräsentation am Dresdner Hof*, ed. Barbara Marx, Munich 2005, pp. 156–169, p. 167; Plaßmeyer 2009 (note 6), p. 23.

40 Syndram, Minning and Vötsch (ed.) 2010 (note 1), fol. 74r.

format, their pictorial design and the production process. The way that the pictorially represented landscape gradually reveals itself in a linear manner as the scroll is unrolled evokes the idea that the viewer is visually retracing the Elector's journeys. Unlike area maps, the route maps show only a limited section of space that can be perceived in the temporal sequence of a movement. They thus imply a punctual, physical presence in the depicted space. The Elector's presence, his perceptions and his measuring activities are inscribed in the route scrolls. August's travels were thus to an enormous extant technologically framed. He himself can be understood as a hybrid of a traveller, surveyor and cartographer, analogous to the itinerant photographer and itinerant map user described by John Urry as fundamental to the visuality of mobility in modernity.[41] In contrast to the average, modern, Western tourist to whom Urry refers, however, the Elector moved in a highly exclusive context of technology, visuality and mobility. The route scrolls helped to mark his special status and role as an active producer of knowledge, and more precisely, spatial knowledge. The media-technological specificity of the glued maps additionally demonstrated efficiency, quality and innovation in August's efforts.

41 John Urry, *Sociology Beyond Societies.*
Mobilities for the Twenty-First Century,
New York et al. 2000, p. 87.