An attempt of comparison of the content of woodcut and copperplate maps issued in Europe until the beginning of the 19th century

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A b s t r a c t. Social expectations regarding the content of maps changed over the centuries and led to the development of new map editing methods and the rejection of outdated reproduction techniques. The article focuses on the circumstances of the introduction of the woodcut and, thereafter, replacement of the woodcut by the copperplate and the positive results of that change.

K e y w o r d s: history of cartography, woodcut maps, copperplate maps, content of maps, density of message on map

1. Introduction[1]

Social expectations regarding the content of maps changed over the centuries and led to the emergence of new map editing methods and the rejection of outdated map reproduction techniques. Today we expect a map to contain an ever growing amount of geographical data and should ever more accurately reflect the reality. But have these always been the expectations with regard to the data presented on the map? Or maybe these expectations have evolved along with the development of civilisation and accumulation of knowledge about the world? What did the authors of old maps want to show, or 'what was the goal defined both by map authors […] and by their future users' (W. Ostrowski 1974, p. 14). Unfortunately, old cartographers rarely gave a direct answer to this question. Instead, one can see what they showed on their maps. The article aims to outline the goals that might have been behind the making of maps by means of a content analysis of selected old woodcut and copperplate maps which in their own time enjoyed recognition of their users.

The kind of support for a printed cartographic image discussed in this article has been limited to paper surface. It was not the only type of support used for that purpose, but within the analysed period, i.e. from the end of the Middle Ages until mid 19th century it was definitely the most popular one and used from the beginning of that period. Paper was manufactured in paper mills in Spain and Italy already in the 13th century, before any printing techniques came into use in Europe. Gradually, though slowly, it replaced leathers tanned to vellum. Paper-making spread in Italy since 1268, with Fabrino near Ancona being the site of the first paper-mills; in France paper-making began in 1320 (the first paper-mills there were established on the Hérault river, Languedoc) and in Germany (in Cologne since 1320, and, thereafter, in Nuremberg since 1390). The first paper-mill in England was built in 1494, and in Holland over a hundred years later (H.U. Wallis, A.H. Robinson 1987, p. 278).

2. Multiplication maps before the introduction of the woodcut techniques

It is known that to create a map it is essential to gather data, to develop a concept for the map and to finally make it. In manuscriptal maps we often deal with one map maker. Thereafter, a copyist needed a lot of time to make each new copy. The multiplication process was time-consuming and, therefore, costly. However, it had one advantage – each subsequent hand copy could be significantly revised and completed. Usually maps could be produced to order, without bearing the risk of not finding a buyer. That method of map production continued to work very well even after the invention of print. From the end of the 13th century at least until the end of the 16th century portolan charts were hand-reproduced, which each time enabled the addition of more accurately measured and newly discovered areas of seas and coasts. Already within a few days' after the return to the mother harbour of the ship whose pilot described the unknown coastlines, the ship could set off for the next voyage with updated maps. This gave a lot of prevalence over the competition and brought huge profits in trade. It is probably for this reason that in the area of the Mediterranean Sea for over three centuries (14th–16th century) the manuscriptal reproduction of navigational maps had not been replaced by print.

3. Woodcut maps

The introduction of printing techniques entailed a necessity of cooperation of map producers at all stages of the map production process. The nearly complete control of a cartographer over the hand-made map is evident, but all the stages of map production that followed at the order of the map's publisher, including the production of the negative matrix and printing, were beyond his control. It was the publisher who decided about the use of materials and the method of copying, as well as the method of the map's distribution, either as a self-standing map, added to the text or as a map included in the collection of maps, later called the atlas.

The map as one of the graphic elements decorating manuscriptal and later on printed codices was a very welcome addition for readers. It didn't have to contain additional geographical information. In the Middle Ages the aesthetic values basically sufficed. However, the inclusion of a map was associated with increased book production costs. Hence the map was expected to be decorative and to give the feeling of luxury. The map, together with other illustrations, decorative initials, illuminations, elaborate marginalia and complex borders, made up the complex graphic decoration surrounding the graphically after all rather austere text.

The earliest preserved map printed with the use of the woodcut method is the miniature image of Earth, not exceeding the size of 7.5 cm, included in *Etymologiae*, the work by the bishop of Seville, Saint Isidore, published for the first time in Augsburg in 1472 (L. Szaniawska 2008, pp. 174, 179–182)[2]. A miniature 'T-O' map of the world inserted into the text was printed with a woodblock in the Günther Zainer printing house. Most probably, that miniature could not meet the aesthetic expectations of the audience, but started a certain process in incunables.

The earliest printed maps had a relatively modest share in decorations surrounding the main text. The ones that followed and were printed from woodblocks as a collection illustrating the work about universal history were more impressive. The incunable titled *Rudimentum Novitiorum sive chronicarum historiarum epitome* was printed in Lübeck by Lucas Brandis of Schass in 1475. Similarly to *Etymologiae*, it presented a typical mediaeval struct-

ure of encyclopaedic Christian knowledge about the history of the world, based on the Bible. It contained several longer geographical descriptions of the world and the Holy Land and two two-page maps covering these areas. The round map of the world (*mappa mundi*) of a 38 cm diameter was based on information contained in the works of either ancient or mediaeval writers, such as Herodotus, Pliny the Elder, Solinus, Bartholemaeus, John Chrysostom, Isidore of Seville and John Mandeville. An unknown author took ideas from the earlier *mappae mundi*, including the location of lands and seas in relation to one another, the round shape of the ecumene and the meaning of the eastern orientation underlined by the paradise placed there, but used a different convention of content selection. He did not surround the image of the continents by a universal ocean. Apart from Rome, marked by a figure of the Pope, he did not mark other cities, but the densely placed icons of fictitious cities on the map, lacking any specific reference, have been diversified in size and shape. The author of the map covered the entire surfaces of the continents with mounds emerging from water which he mostly marked by nearly one hundred names of states and lands. In southern Asia he, among others, placed the names: 'Persia, Arabia, Terra amaleth, Sabea, Ophir and Palestina'; in northern Asia – 'Armenia, Affaria, Albania, Amasonia, Galilea, Medea, Samaria, Siria and Judea'; in Africa – 'Lybya, Egiptus, Ethiopia, Maditania' (probably Mauritania), whereas in Europe, from east to west, he marked – 'Tartariea, Ciprus, Creta [both islands marked as states], Moscauia [the Duchy of Moscow], Littauia [Lithuania], Pruscia [Prussia], Slauia minor, Grecia, Ponegaria [perhaps it is Bulgaria], Macedonia, Polonia, Vngaria, Bohemia, Saxonia, Holsacia, Vinland, Gothia, Frisia, Liuonia [Latvia], Dacia, Anglia, Morauia [Moravia]' etc. It follows from the above list that the location of lands in relation to one another is not the map's strength. Along the coastline of Asia and Africa, the author placed also names of islands or mountains, e. g. in south-eastern Asia he marked 'Tabrobana' (it seems it is the only Ptolemaic, slightly distorted name of the island Taprobana) and next to it the mountain 'Mons auri', and further to the west 'Tile insula' (if it were to be Thule Island, its location in this part of the map would make no sense), whereas in southern Africa mountains: 'Mons calesti, Mons alpharye, Mons aliariorum'. The only name on the map referring to the sea is 'Mae

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[2] More about the woodcut technique, cf.: S. Peliwo 1991, pp. 9–23; F. Grenacher 1970, pp. 31–41; D. Woodward 1975, pp. 25–50, J. Stebnowski 1933, pp. 5–22.

amasoneorum' (perhaps it is the Caspian Sea) located in the northern part of the map.

The author marked relatively many names of states and lands, as for a woodcut map of the world (T. Campbell 1987, pp. 144–145). The much later maps included in the Chronicle by Hartman Schedl (1493) or Sebastian Münster (1532) and the later ones printed in Geography (since 1540) and Cosmography (since 1544) by the same author contained no more than a

from left to right, giving the image of a mirror reflection, e.g. 'LIBIA ИИFERIOR', 'MARE ИИD-IOCVM'. The same occurred on other maps of this edition, e. g. on *Germania* in the words: OCCEAИИVS GERMAИИVS and GERMAИIA MAGИA'. But on this specific map the letter 'N' in the name 'OCCEANVS SARMATICVS' is printed correctly (K.-H. Meine 1982, fig. 17 and 25). One more error crept into that map of the world in both editions. The tropics of Cancer

Fig. 1. Central Europe on parts of maps: A – 1475, original part 7×10 cm (whole map 38 cm diameter), B – 1488, original part 7×9.5 cm (whole map 36 cm diameter), C – 1491, original part 6.5×9.5 cm (whole map 30.5 cm diameter)

half of these names, but instead they were marked in places that were closer to their actual location. Taking into account the number of names, it should be underlined that the presentation of the geographical content on the map of the world in *Rudimentum Novitiorum* was more efficient than in the case of other 15th and 16th century woodcuts maps (as well as 15th century copperplate maps to be discussed below). In addition, its three editions may indicate a large interest of the users.

The map from *Rudimentum Novitiorum*, similarly to other maps printed from woodblocks, had one fundamental disadvantage. For each edition of the work the woodblocks had to be made anew which as it can be seen in figure 1 was a reason to additional errors. And thus in the French language edition of *La mer des hystoires* prepared by Pierre Le Rouge and Guillaume le Bret in Paris in 1488, including a map printed from new woodblocks, the name 'Polonia' was replaced by the name 'Poulame'. In the next French language edition, engraved again and printed in Lyon by Jean Dupré in 1491, 'Polonia' was changed to 'Pousaine' (fig. 1C).

No more solid were the woodblocks used to print maps in the editions of Ptolemy's *Geography* published in Ulm in 1482 by Lienhart Holle and in 1486 by Johann Reger. The map of the world included there according to the concept of the ancient geographer's map was drawn by Johannes Schnitzer. The printers of the first and second edition did not avoid errors and the letter 'N' was in many cases reversed

and Capricorn at times were described correctly, i. e. the northern one as 'Tropicus cancri', and the southern one as 'Tropicus Capricorn', but in a part of the impressions the tropic of Capricorn received the name of the tropic of Cancer. In fact, it is not known whether the error was corrected or introduced during the repair of the woodblock, because it occurs in codices dated 1482 and 1486[3].

In a later period, e.g. in the publishing house of Sebastian Münster, the same woodblocks were used for several editions of Claudius Ptolemy's *Geography* in the years 1540, 1542, 1545 and 1552, but they underwent many repairs, including completions and replacements of inscriptions set from types. Despite this errors were not avoided. The most frequent errors were letters that were mixed around, inscriptions printed upside down or missing inscriptions caused by a missing woodblock insertion in the slot of the main woodblock. On account of low durability of the material cases of trade in woodblocks are unknown.

The above presented examples of woodcut maps from *Etymologiae* and *Rudimentum Novitiorum* accompanied texts that contained only small fragments referring to the geographical description of the world. Henceforth, the authors did not have many data to convey on the maps thus they were relatively empty. The case with the editions of *Geography* from Ulm

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[3] In the book of K.-H. Meine 1982, Fig. 25, the tropics are given correct names, and in R. Shirley 1987, pl. 20 their names are mixed up.

was different. Here many data were included, but the format of the book – *folio* and of the maps – *plano* gave large surfaces to fill with content and that is why also these maps make the impression of being empty. It might have been different in the case of regional maps, e.g. of Palestine which was known since the Antiquity and often visited by Europeans. Thus the map of its territory might have contained many details.

As an example of a woodcut map I chose the map of Palestine authored by a wood engraver

dimensions of 27×127 cm so it could fit into the format of a codex (32×23 cm, folio), was folded in six. The map has an eastern orientation, and its part depicting Jerusalem has a western orientation. It presents the Middle East area from Tripoli to Alexandria, covering in the east the mountain ranges dividing Palestine from Syria, Syria with Damascus, Lebanon, the Red Sea and Arabia with Mecca, and in the west the coast of the Mediterranean Sea (R. Röhricht 1901, pp. 131–132). In the middle of this area is inserted a bird's eye view plan of Jeru-
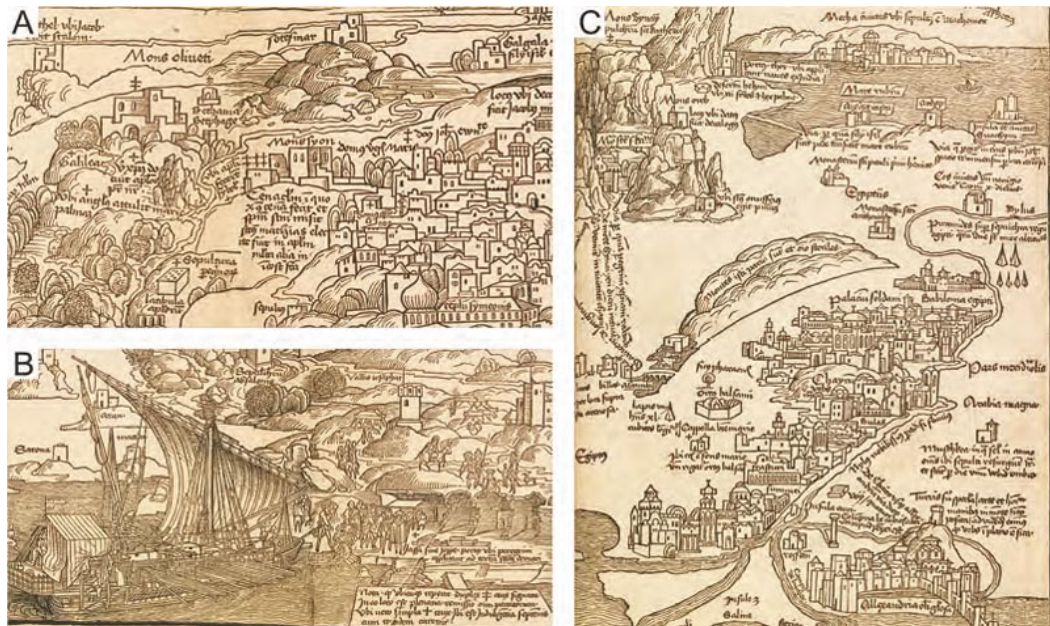

Fig. 2. Parts of the map of the Holy Land from the work by Bernhard von Breydenbach *Peregrinatio in Terram Sanctam* of 1486: A – a part of Jerusalem, original part 9×16.5 cm, B – a map's legend, original part 11×21 cm, C – Alexandria, Cairo, the Red Sea and Mount Sinai, original part 26×20 cm (from the collections of the Metropolitan Museum of Art)

and printer, Erhard Reuwich (1480s), coming from Utrecht and active in Mainz. In the years 1485–1486 he made the illustrations and the map of the Holy Land and Egypt to the work by Bernhard von Breydenbach (ca. 1440–1497) *Peregrinatio in Terram Sanctam* printed by Peter Schoffer the Elder in 1486. The author of the text together with E. Reuwich went on a pilgrimage to the Holy Land from April 1483 until January 1484 and described their observations (*Bernhard von Breydenbach...* 1911). Their journey took them from Mainz to Venice, and then to Corfu, Crete and Rhodes from where they sailed in a galley to Jaffa. They visited Jerusalem, Bethleem, Mount Sinai, Cairo and Alexandria.

The map of the Holy Land and Egypt printed from three woodblocks having in total the

salem in a scale several times bigger than the rest of the map. Also the scale of individual objects changes depending on their meaning which is typical for maps from the Middle Ages and the beginning of the Renaissance. And thus the Mount Sinai (fig. 2C) is relatively bigger than the area occupied by for instance Bethlehem. At the bottom of the map, in its middle part, a picture of a sail-equipped galley was placed (perhaps it is a faithful image of the galley known to the authors from their pilgrimage), which sailed into the port of Jaffa. Next to the port, there is a note saying 'Jaffa or Joppe, the port where pilgrims arrive in the Holy Land'[4].

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[4] The original inscription reads: 'Jaffa sive Joppe, portus, ubi peregrini applicant ad terram sanctam de Mari'.

In the background an undulating landscape has been drawn, with pilgrims and horses. It ends at the walls of Jerusalem behind the Golden Gate (next to the inscription CIVITAS IHERVSALEM), the stream of Cedron flowing underneath and, on their left side, the Valley of Josaphat ('Vallis iosephat') and the Sepulchre of Absalom ('Sepulthium absaloms'). Inside the walls many complexes of buildings were drawn, in a variety of architectural styles, but only some of them, probably the most important ones according to Reuwich, were supplied with a name or a note, such as e. g. The Temple of Salomon ('templum Salomonis') (on its ruins later the Al-Aksa mosque was built) and at the rightmost edge of the walls the St. Stephen's Church – 'locus ubi sanctus Stephanus fuit lapidatus' (fig. 2A). The legend placed against the background of the sea at the entrance to the port of Jaffa says that 'in the place marked with a double cross one may obtain an absolute indulgence from sins and in the place marked with a single cross a partial indulgence is available, i. e. an indulgence of seven years and seven *quadragenes* [280 days]'[5] (fig. 2B). With a simple cross are marked among others: the cemetery of the pilgrims 'Sepultura peregrinorum', and on the left side of the town – the place where the angel brought Mary the palm 'Ubi angelus attulit marie palmam' and where Christ taught the Apostles the Pater Noster prayer – 'ubi Christus docuit apostolos pater noster'. With three double crosses and a relatively extensive note the map's authors marked the Mount Zion with its important sites such as the Tomb of David, Virgin Mary's Basilica and the Room of the Last Supper where 'Christ had the Last Supper and where the Holy Ghost came down upon the apostles, Matthew was appointed an apostle and many other things happened'[6]. To present the content of the map only few characteristic examples were chosen to demonstrate its tourist and pilgrimage-oriented nature. It seems that for the first time, speaking in terms of the content about the Holy Land, the map was just as important as the main text, and one may even presume that for other pilgrims it was a sufficient document that helped them to organize their own memories.

The fact that proves its popularity is that already in 1488 the map was printed from a copperplate and included in subsequent descriptions of pilgrims' travels. The new image of Jerusalem came into being only in the middle of the 16th century.

In several European countries, the first two decades of the 16th century saw the efforts to produce a modern, Renaissance-inspired general map of their territories. Those countries were the Czech Lands, France, Hungary, as well as Poland and Lithuania. The outcome of those efforts were woodcut maps of: (i) the Czech Lands authored by a doctor and printer Mikuláš Klaudyán, published from woodblocks at the scale ca. 1:685,000 in Nuremberg in 1518, containing 280 names of towns (*Dawne i obecne mapy* 2013, p. 1); (ii) France *Nova totius Galliae descriptio Orontius F. Delphinas faciebat* produced by a French mathematician and cartographer Oronce Finé and printed from four woodblocks for the first time by a printer from the University of Paris, Simon de Colines in 1525, at the scale ca. 1:1,800,000 with 124 towns for which geographical coordinates were calculated anew[7]; (iii) Poland and Lithuania by Bernard Wapowski according to Karol Buczek titled *Mappa, in qua illustrantur ditiones Regni Poloniae ac Magni Ducatus Lithuaniae pars* printed at the scale ca. 1:1,000,000, in Cracow at Florian Ungler's with the names of over 1,000 towns and villages (K. Buczek 1963, pp. 28–31); (iv) Hungary by Lazarus (secretary of the Cardinal of Esztergom) *Tabula Hungariae ad quatuor latera* engraved and printed from four woodblocks by Petrus Apianus in Ingolstadt in 1528, 67.3×53.6 cm, containing 1, 270 towns, including 356 from the territory of today's Hungary (Z. Török 2007, pp. 1821–1825). All those maps were woodcut maps.

Three of these maps – of France, Poland and Hungary, as it is shown in figure 3 – were characterised by similar density and method of presentation of the individual elements of the settlement network, river network and orography. The size of the letters and the form of geographical names' highlighting were also very similar. The main difference was addition by Wapowski of a cartographic graticule, but unfortunately little can be said about it on the basis of the small preserved parts.

[5] The original inscription reads: 'Nota quod ubicumque reperit duplex ‡ crux signata In eo loco est plenaria remissio omnium peccatorum. Ubi vero simpla + crux, Ibi est Indulgencia septennis cum tottidem carenis'.

[6] The original inscription reads: 'Coenaculum in quo Christus caenam fecit et Spiritum Sanctum misit, Mathias electus fuit in apostolum, multa alia in isto loco sunt facta'.

[7] The oldest preserved copy of the map comes from 1538 and is held in the collection of the University Library in Basel. For more data about the map cf. M. Pelletier 2007, pp. 1480-1483.

The earliest of them all, the map of the Czech Lands, had a relatively dense road network, i. e. the element linking the capital with towns. It stood out against the other maps

On the map of France the borders were not graphically highlighted. Their existence was signalized by breaking off the content along the lines marking the objects that naturally create
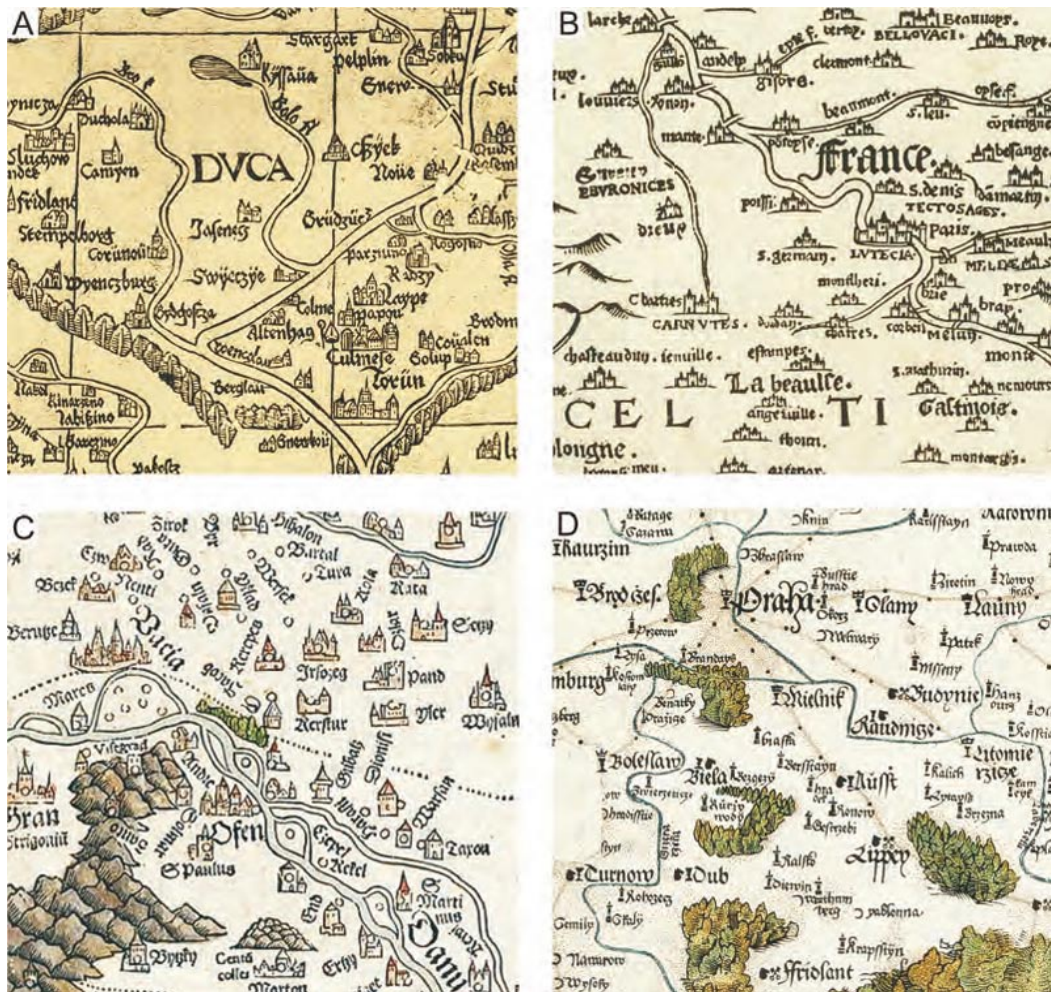

Fig. 3. Parts of woodcut maps (reduction ca. 1:1.5): A – *Polonia* by Bernard Wapowski of 1526, B – *Gallia* by Oronce Finé of 1525; the 1538 edition, C – *Tabula Hungariae* by Lazarus of 1528 and, D – Czech Lands by Mikuláš Klaudyán of 1518

through the use of appropriate cartographic signs reflecting the functions of all towns (fig. 3D). The territory of the Czech Lands was surrounded by a drawing marking large forest complexes. It seems that they substitute on the map the drawing of the borders. On the maps of Hungary and Poland they were presented respectively as a line composed of rows of dots on the map of Hungary, and rows of trees delineating the borders on the map of Poland[8].

the state borders: the sea, the Rhine, the Pyrenean Mountains and the Alps.

Despite certain differences in the selection of information about the territory of the state, the degree of detail and the legibility of data was similar. The scope of content allows to qualify the maps as general purpose maps, and also to think that they were meant for educated, middle-class persons who reached for them to expand knowledge or to look for entertainment. Probably for this reason the maps did not have to contain more information, and the width of

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[8] According to Polish scholars: Karol Buczek and Henryk Rutkowski.

the line obtained thanks to the woodcut technique gave sufficient reading comfort as shown in figure 3.

The above general maps were of fundamental importance for their 16th century creators. B. Wapowski's map, despite the fact that most of the impression was burnt, was definitely known to Gerard Marcator and served to present this part of Europe on his globe and map of Europe (according to S. Alexandrowicz 2014, pp. 66-68). The maps of the Czech Lands and Hungary provided a basis for Sebastian Münster's maps of the territories of those states for *Cosmography*. The map most criticised of them all was the map of France which received bad reviews, however not due to the used printing technique but due to the outdated Latin names
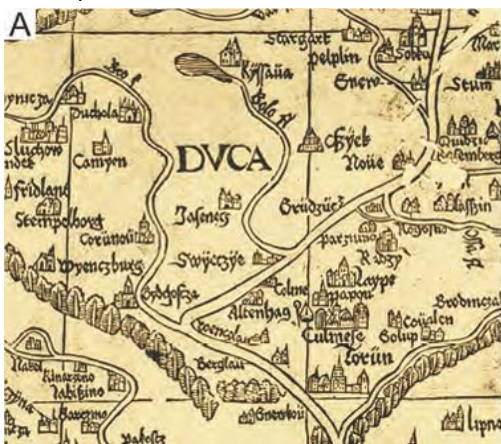
were printed from woodblocks. At the same time, south of the Alps, in Italian cities maps were printed from copperplates. The choice of the printing technique was probably linked with the printing house's experience. A good example can be provided by the subsequent editions of Ptolemy's *Geography*, wherein the geographical contents on all map versions were the same but the type of the matrix was different. The first edition of 27 Ptolemy's maps printed from copperplates and edited by Nicolaus Germanus took place in the Bologne-based printing house of Domenico de Lapis in 1477. The same number of maps, though from different plates, were printed by Arnoldus Buckinck in Rome in 1478. The next edition of Francesco Berlinghieri printed by Nicolo Todescho in Flor-

Fig. 4. Parts of maps: A – a woodcut map *Polonia* by Barnard Wapowski of 1526, reduction ca.1:1.5, B – a copperplate map *Accipe candide*… by Giacomo Gastaldi of 1562, scale ca. 1:1 (from the collections of the Biblioteca Nazionale Marciana in Venice)

based largely on K. Ptolemy's map[9] (M. Pelletier 2007, pp. 1480–1483). Cartographers of the second half of the 16th century: Giacomo Gastaldi, Gerard Mercator, Abraham Ortelius, Gerard de Jode[10], Matthias Quad and their followers, by copying the geographical information were at least generally considered correct and made the names of the creators famous.

4. Copperplate maps

Towards the end of the 15th century in cities like Mainz or Augsburg, and later on also in Basel, Cracow, Paris and Nuremberg, maps

ence in 1482 was the first edition to contain 31 maps in total, including 27 Ptolemeian maps and 4 *tabulae modernae*. The first edition had an impression of ca. 500 copies, the later ones were even bigger.

In Italian towns, the craft of engraving maps in copper plates developed for the following one hundred years. The first known bookseller who acquired and sold copperplate maps was a Florentine painter and engraver, Francesco Rosselli (1445–1513) (D. Woodward 2007, pp. 773-774). At the turn of the 15th and 16th centuries, copper plate engravings in cartography were still a fledgling technique and the cosmographers and engravers active at that time, such as Francesco Rosselli, Marino Sanuto, Francesco Berlinghieri, introduced an array of innovations in their maps. The positive features of this material consisted primarily in the fact that the copperplate was relatively durable

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[9] Its author, after nearly forty years, made a new map which was issued in 1561 using data derived from Renaissance sources and astronomic calculations.

[10] To make a map of Poland, Abraham Ortelius and Gerard de Jode used the 1562 map by Wacław Grodecki, whereas the maps of the Czech Lands and Hungary they drew on the basis of works by Mikuláš Klaudyán and Lazarus.

and the engraved image could be stored for dozens of years without any major detriment to its clarity. One could add new fragments after obliteration or etching of the previous engraving (J. Stebnowski, 1933, pp. 22–26)[11]. The growing collections of copperplates were gradually developed and sold.

When the age of discovery began, the demand for the latest geographical information was huge and Italian publishers started to make a lot of money on geographical and travellers' books as well as guides to Italian cities in which they included newly made or just copied maps or plans. After the successes of the Roman editions of *Geography* (4 editions in the years: 1487, 1490, 1507, 1508), the bookseller Antonio Salamanca (1500–1562), active since around 1540 in Rome, and brothers Michele and Francesco Tramezzino, who were printers since 1527, originally based in Rome, and then also in Venice opened bookshops in 1550 in Venice, greatly extended their assortment in maps (C. Witcombe 2004, pp. 112–114).

The first half of the 16th century was also a period of a significant growth of influx of pilgrims to Rome. Their interest in the books describing the Eternal City and its architecture

erated with A. Salamanca, and after his death he continued to trade in maps and atlases with great success, and even invented a special formula for them. A. Lafreri's atlases were made from maps previously printed to order or bought from other publishers and held in the bookshop or sometimes impressed from the purchased copperplates and put together into book-format collected editions. Those editions contained maps of various countries and regions in Europe. Over 600 maps passed through the warehouses of A. Lafreri's bookshop (R. Tooley 1970, p. 20) and he included them in the subsequently published atlases. The main cartographer whose work was commissioned by A. Lafrieri was Giacomo Gastaldi. His maps were a typical example of cartographic documents impressed from copperplates.

As we compare the image of the lower course of the Vistula on the 1526 B. Wapowski's map with an analogous image on the map of G. Gastaldi titled *Accipe candide lector absolutissimam Septentrionalium regionum, Suetiae, Gotiae, Norvegiae…* published in *Lafreri Atlantes* in 1562 (fig. 4A,B), we can see that the content of the map of the Venetian cartographer is poorer despite the fact that it was
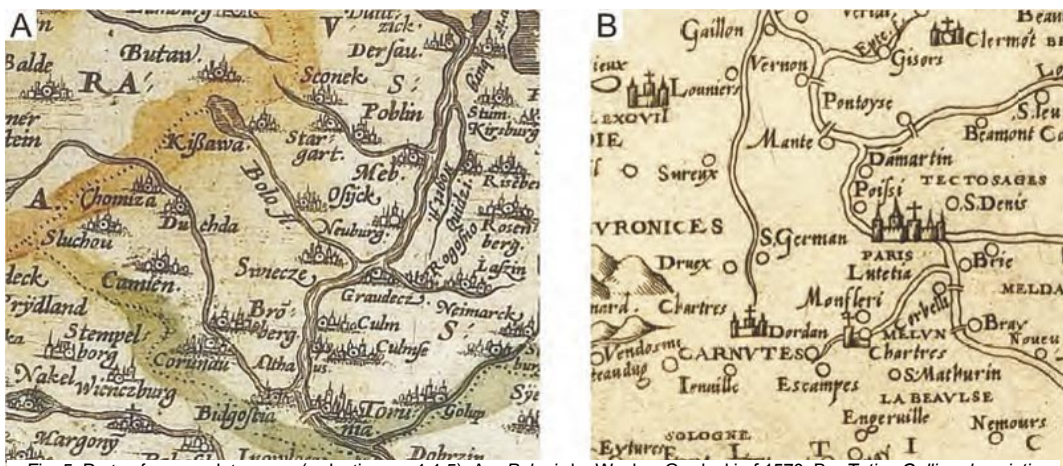

Fig. 5. Parts of copperplate maps (reduction ca. 1:1.5): A – *Polonia* by Wacław Grodecki of 1570, B – *Totius Galliae descriptio* by Oronce Finé of 1561

contributed to the development of publications showing the Roman monuments and heritage sites, and to the increase of supply of prints by A. Salamanca and Tramezzino brothers. In 1544, they were joined by Antonio Lafreri (D. Woodward 2007, p. 775). At first, he cooperated

made over 40 years later and impressed from a plate allowing a much greater density of the drawing. Only the map of Poland and Lithuania by Wacław Grodecki *Poloniae finitimarumque locorum descriptio* edited by Abraham Ortelius, published for the first time in *Theatrum orbis*

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[11] For a broader discussion of the copperplate technique cf. also: D. Woodward 1975, pp. 51–73, J. Stebnowski 1933, pp. 22–28.

terrarum in 1570 at scale ca. 1:2,600,000[12] (examined within a fragment of the same region, fig. 5A), contains a similar amount of information as B. Wapowski's woodcut map issued 40 years earlier.

Fig. 6. A part of the urban landscape and walls of Szczecin on a plan by Georg Braun and Frans Hogenberg of 1588 (original fragment 4.3×8 cm, sheet 33×47.5)

Failure to use the technical possibilities offered by copperplate can also be seen if we analyse the content of some copperplates issued in the second half of the 16th century, e.g. the maps of Oronce Finé *Totius Galliae descriptio cum parte Angliae, Germaniae, Flandriae, Brabantiae, Italiae, Romam usque Orontio F. Delph. autore* issued in Venice by Dominicus Zenoy in 1561 and their renewed edition issued there by Bibliothecae divi Marci in 1563, at the scale ca. 1:3,700,000. Figure 5B shows the middle part of France with the dominating Paris. A comparison was made between a selected part of W. Grodecki's map and the matching part of O. Finé's map of France. Those areas were drawn on the maps in similar scales and show relatively densely populated and developed territories. Despite this, maps contains almost equally little information, and many blank places have remained on their surface. Both maps feature names printed in large letters and rivers of significantly over-scaled widths.

Starting from the end of the 15th century, the increased demand for prints brought with it the growth of publishing houses and the increase of impressions, whereas the woodcut was gradually replaced by the copperplate. This happened not because of the lack of possibility to present more detailed information. The woodcut was a less durable medium and was hardly fit for data updating. Besides, conservation of wood was a troublesome process.

Over the next centuries, the content of maps and graphic symbols underwent gradual modifications. Cartographic signs within individual groups underwent significant unification, but the line in linear elements remained equally thick as in woodcuts and the inscriptions containing geographical names filled a major part of the map's surface. The possibilities of increasing the density of the drawing in a copperplate were large as it is shown in figure 6, but on the 16th century general purpose maps they were not used in full. Already the work issued in Cologne in the years 1572–1617 by a team of cooperating artists-cum-craftsmen, Georg Braun and Frans Hogenberg, *Civitates orbis terrarum*, right from the first volume contained plans and panoramas of towns characterised by very rich content and an image filled with lines. A bird's eye plan of Szczecin *Alten Stettin* published in volume 4 dated 1588 provides a good example.

Also on the maps issued later it is clear to see how the authors failed to fill the paper and the copperplate with content. A good illustration of this phenomenon is provided by the navigational map by a popular Dutch engraver and publisher, Frederick de Wit, active in Amsterdam in the period around the year 1700. It was published for the first time as *Occidentalior Tractus Indiarum Orientalium a Promontorio Bonae Spei ad C. Comorin* in 1675 and it was reproduced until 1715. It might thus be presumed that it enjoyed popularity.

The map presents the western part of the Indian Ocean with eastern coasts of Africa and western coasts of the Indian Peninsula. Due to its purpose, it presented in detail only the coastline of the seas with only those points marked which are essential for navigation, such as harbours, bays, shallows, rocky capes etc. Their image, though, was far from complex. The line delineating the coastline is still thick, schematic and clearly falls short of any accuracy. At the same time, on the same map the title cartouche has been embellished with a very detail-rich genre scene. The map's engraver, to create an illusion of 3-dimensionality in a drawing depicting a lion used all of his craftsmanship and artistic skills as illustrated in figure 7C. The content elements of copperplate maps and their decorative cartouches were prepared in a similar way until the end of the 18th century.

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[12] For a description of the history of the map's original of 1558 and the reprinted index of names, cf: W. Grodecki, F. Melanchton 2011.

The first visible changes in the drawing's density appeared on topographic maps commissioned by various state authorities already towards the end of the 18th century. The need

Secondly, H. Berghaus introduced a different set of graphic signs from the one used by G.D. Reymann. The sheets of the first edition of a map of an area of Silesia were given the new
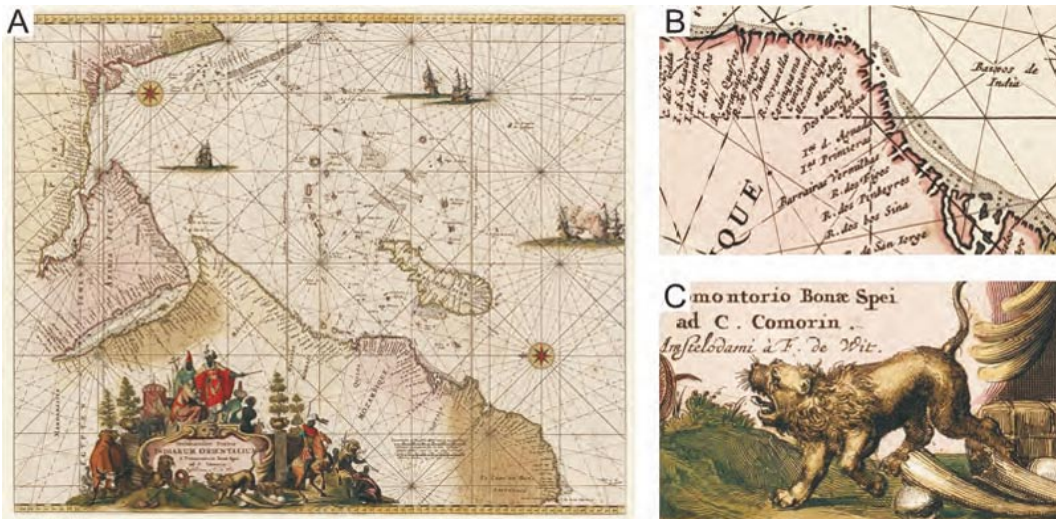

Fig. 7. The Indian Ocean on the map by Frederick de Wit of 1675: A – original whole map 42×53.5 cm and its parts: B – coastline of the middle part of Mosambique, original 4.5×7.5 cm, C – decorations of the map's cartouche, original part 4.5×7.5 cm

to include many details that were necessary to manage the territory caused that the map's surface began to, as it were, run out of space. A good example here is the map of Gottlob Daniel Reymann designed at the beginning of the 19th century *Topographische Special Karte von Deutschland* scale 1:200,000, edited and published systematically from 1806 until as late as 1920 (L. Szaniawska 1996, pp. 91–98), on which one can see changes in the graphic layout of the copperplate map associated with the user's changed expectations. The sheets of the map elaborated by G.D. Reymann and issued from 1806 until 1816 feature drawings made in a relatively thick line, whereas those made in later periods were given finer lettering and a more delicate line. The sheets published in the years 1816–1821 when their production was supervised by the geographer Heinrich Berghaus are characterized by a more modern touch.

First of all, on the territory of the Kingdom of Prussia topographic works were in progress then, under the direction of Carl Wilhelm Oesfeld, and the density of points in the triangulation network was increased. New measurements helped to improve the cartometry of the presented areas.

style of a Reymann's map. This is well illustrated by figure 8A with the part of sheet no. *112*, engraved by K. Jäck. The next edition of the content of the sheets was prepared in the years 1822–1838 when the new legend was developed for the entire map under the direction of H. Berghaus. In 1831, the *112. Gross Glogau* sheet part was edited and drawn again by artillery lieutenant Fils, and engraved by Heinrich Brose and Siebert (fig. 8B)[13]. Its most distinctive features are the significantly smaller size of the lettering and the use of new cartographic signs (L. Szaniawska 1996, p. 95, fig. 37).

The degrees and minutes of geographical latitude marked on the left frame served as a basis to show the scale of the presented fragments. Changes in the location of towns with respect to one another and changes in the directions of roads are clear to see. Cartometry of the sheet differed so widely that showing the same area entailed the necessity to change the dimensions of the figure 8B versus figure 8A.

For the sheets of the map that were drawn anew in 1838 the set of signs was extended by W. Hammer. After the map then called *Reymann's Special Karte* was taken over in 1844

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[13] The data on the sheet's authorship are behind the inscriptions placed beneath the sheet's bottom frame.

by Karol Fleming's publishing house, the method whereby the new sheets were prepared and published plus the old sheets of G.D. Reymann's map reedited remained practically unchanged, and the set of graphic signs and the size of the lettering applied therein were used throughout the period when the map was renewed, i. e. until 1920.

5. Conclusion

The article focuses on the circumstances of the introduction of the woodcut and, thereafter, replacement of the woodcut with the copperplate and the positive results of that change. The above presented examples of first woodcut maps from *Etymologiae* and *Rudimentum Novitiorum* accompanied texts that contained only
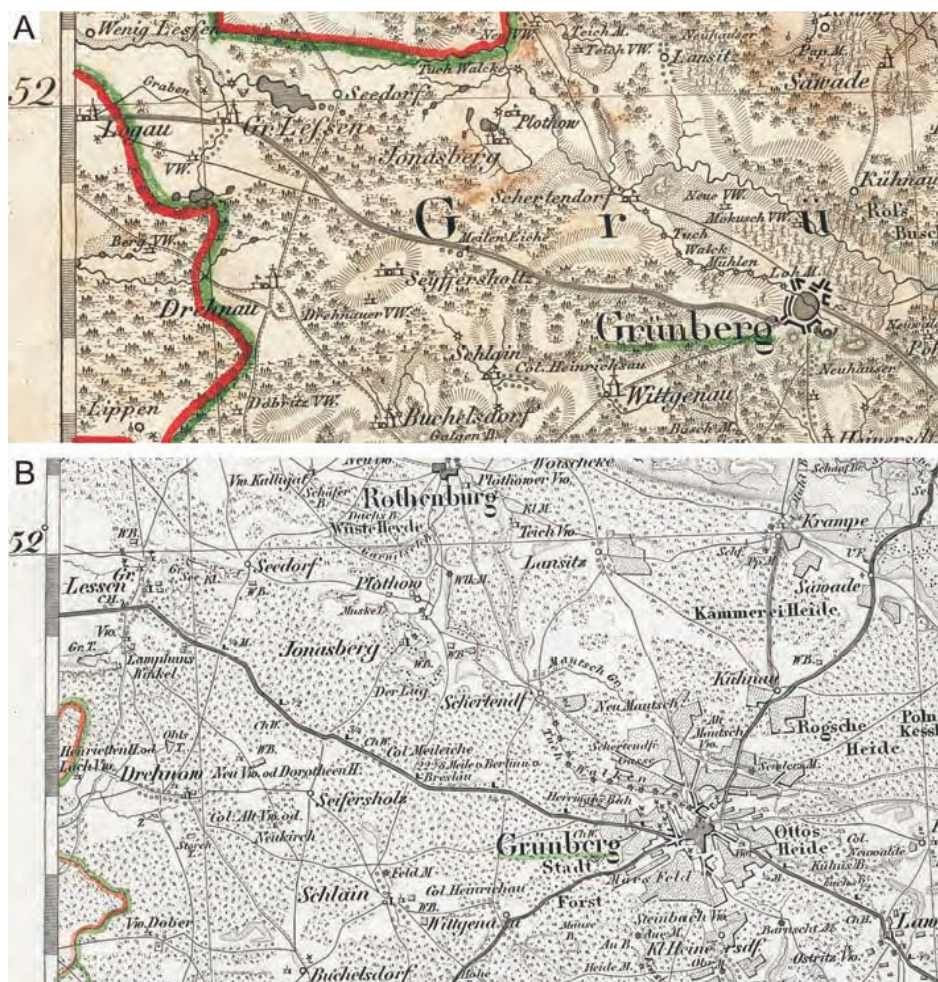

Fig. 8. A part of the Gottlob Daniel Reymann's map's sheet no. *112 Gross Glogau* (enlarged ca. 1:1.5):
A – before 1821, B – in 1831

Examples of sheets of G.D. Reymann's map demonstrate that the abandonment in mid 16th century of unstable woodblocks for the benefit of copperplates opened up the possibility to mark more detailed geographic information, i. e. to use the medium's surface in a more efficient way. It needs to be underlined that this advantage of copperplates began to be fully used only in the 19th century.

small fragments referring to the geographical description of the world. Henceforth, the authors did not have many data to convey on the maps thus they were relatively empty. It seems that for the first time, the map of the Holy Land and Egypt printed from three woodblocks (1486) was extensive picture and just as important as the main text.

In the first two decades of the 16th century they printed woodcut maps of the Czech Lands, France, Hungary, as well as Poland and Lithuania. Despite certain differences in the selection of information about the territory of the state, the degree of detail and the legibility of data was similar. The scope of content allows to qualify the maps as general purpose maps, and also to think that they were meant for educated, middle-class persons who reached for them to expand knowledge or to look for entertainment. Probably for this reason the maps did not have to contain more information, and the width of the line obtained thanks to the woodcut technique gave sufficient reading comfort.

On the basis of B. Wapowski's and G. Gastaldi's maps presenting southern Prussia it has been proved that early copperplates did not depict a larger number of objects than woodcuts and contained many blank spaces (which can also be seen in O. Finé's map of France of 1561). Maps printed until mid 19th century, the sheets of the G. D. Reymann's map were discussed which provide a good example of several stages of miniaturisation of cartographic signs and lettering paired with the gradually increasing density of presence of topographic objects. The effects of cartographers' work visible in the map's content have also helped to demonstrate the expectations of users of old maps (private persons and institutions). Social expectations regarding the content of maps led to the development of new map editing methods and the rejection of outdated reproduction techniques. Although the Europeans' needs changed over the centuries, publishing houses for maps and atlases continued to flourish which means that, in each period, they were successful in satisfying users' expectations.

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Summary

The analysis of the content of maps showed to what extent the quality of the 15th and 16th century maps was the result of the available copying techniques and to what extent the possibilities provided by the woodcut and the copperplate were used. On the basis of notes from E. Reuwich's map of Palestine it has been proved that the authors of maps, bearing in mind the intention to reach as many users as possible, next to data typical for the description of lands and towns, provided also information that was important for each Christian (indulgences). Using the example of a 17th century navigational map by F. de Wit, it has been demonstrated what great attention cartographers have attached to graphical decorations that made the map more attractive even if they contributed nothing new to the geographical content. At the same time, it has been proved that as far as embellishment was concerned the engraver's skills 'went hand in hand' with the cartographer's insufficient attachment to detail.

The comparison of the woodcut maps of the Czech Lands, Hungary, Poland, as well as France from the beginning of the 16th century demonstrated a similar scope of their content and a similar image density while a variety of graphic signs and typefaces were used. Using the example of the map taken from *Rudimentum Novitiorum*, it has been shown that a graphically primitive map may contain a greater number of geographical objects than maps newer by even half a century later and looking seemingly more professional.

On the basis of B. Wapowski's and G. Gastaldi's maps presenting southern Prussia it has been proved that early copperplates did not depict a larger number of objects than woodcuts and contained many blank spaces (which can also be seen in O. Finé's map of France of 1561). Maps printed until mid 19th century, the sheets of the G.D. Reymann's map were discussed which provide a good example of several stages of miniaturisation of cartographic signs and lettering paired with the gradually increasing density of presence of topographic objects. The effects of cartographers' work visible in the map's content have also helped to demonstrate the expectations of users of old maps (private persons and institutions). Although the Europeans' needs changed over the centuries, publishing houses for maps and atlases continued to flourish which means that they were successful in satisfying users' expectations.

Translated by K.D. Diehl