

ASTRONOMICAL CODICES IN THE CORVINIANA LIBRARY

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“Habent sua fata libelli”

ABSTRACT. King *Matthias Corvinus* established an outstanding Renaissance library, the *Bibliotheca Corviniana* — consisting of 2000–2500 volumes — in the Royal Castle of Buda. After his death in 1490 the library was not developed further by his successors. Many volumes were given away as gift by them. As soon as a half century after his death, in 1541 the Turks occupied Buda. The codices were taken to Istanbul and most of them perished. Among the surviving volumes (it is roughly 10 per cent of the original volume content) 7 codices deal with astronomy.

Short story of the Library

The famous Renaissance library of *King Matthias Corvinus* (who reigned from 1458 to 1490) could not have come into being without some favourably converging circumstances in the fifteenth century Buda.

The Italian influence in Hungary was felt from the beginning of Hungarian statehood. *St. Gellért*, who was guardian to the son of Hungary's first king (*St. Stephen*), and later became Bishop of Csanád came from Venice. Genoese Merchants had long used the Danube as an inland trading route in Europe. In the 14th century Hungary had a few kings from the Neapolis branch of the Anjou Dynasty. The connections continued to evolve in various ways. During the reign of *Sigismund of Luxembourg*, King of Hungary (1387–1437) and for a certain period Holy Roman Emperor, the ties between Hungary and the rest of Europe developed even further.

Italian humanists and their delegates visited Hungary. Notable among them is *Pier Paolo Vergerio* who entered the service of *King Sigismund* at the synod of Constance and subsequently lived in Hungary until 1444. By virtue of his personal cultural connections, unequivocally he played a significant role in helping humanism spread.

Thus, the conditions were established for the Renaissance culture that originated in Italy to be assimilated in Hungary. Hungarian promoters of humanism came to the fore. *János Vitéz*, Bishop of Nagyvárad and later Archbishop of Esztergom (Strigonium), exerted great influence in this regard. The Renaissance library in the archbishop's palace in Esztergom was probably a prime example for the young king's literary ambitions. Under the directives of the Archbishop's cultural policy, a new generation of Hungarian humanists were growing up. *Janus Pannonius*, for instance, became a humanist poet well known all over Europe. As Bishop of Pécs, he amassed a fine library consisting of Latin and mostly Greek works (CSAPODI-GÁRDONYI, 1984).

Having matured under the guardianship of reputed humanists (*János Vitéz* and the Polish *Gregorz Sanocka*), the young *Matthias* put his mastery of Latin into practical use as an interpreter of his father, the Turk-basher Hunyadi, the military commander, who was not very well versed in that language. From his early youth, *Matthias* had his own book collection. He inherited his father's volumes and (later as a king) he acquired the book collection that had existed in the royal palace.

Thus, the library came about in a spontaneous manner from several sources. In the early 1470's it was generally known outside Hungary and it kept increasing in size and fame until the king's death in 1490.

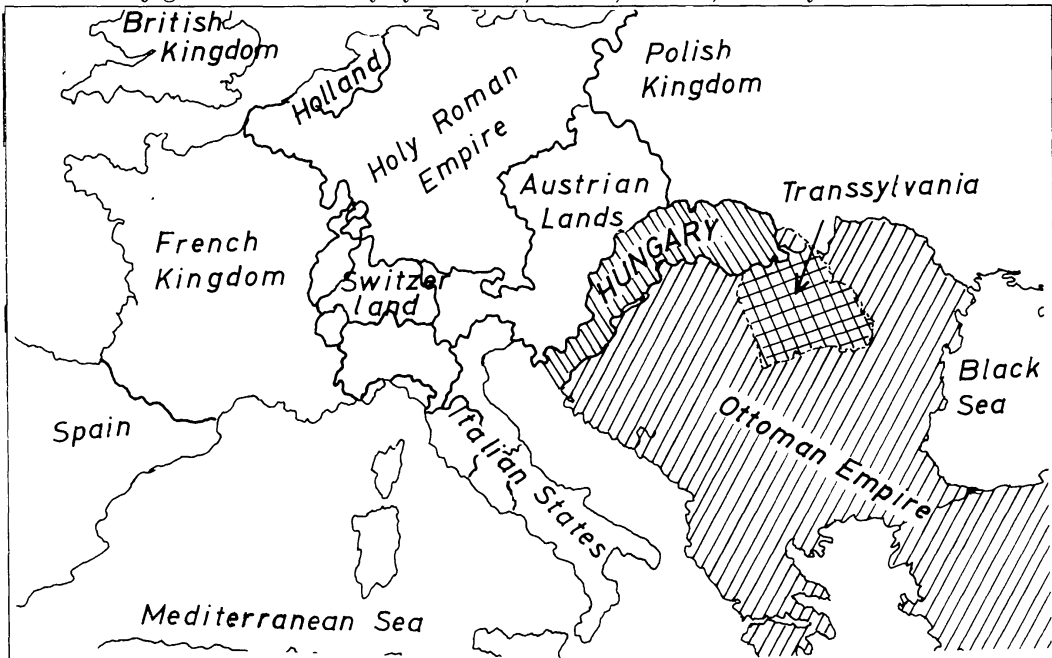
In 1476 *Matthias* married *Princess Beatrice d'Este of Aragonia*. This royal union lent new momentum to the Hungarian adoption of the Italian cultural trends. The genuine heyday of the *Corviniana Library* was the 1480's, the last decade of *Matthias*' rule. *Taddeo Ugoletto* arrived in Buda during this period. The acquisition of voluminous Greek manuscripts into the *Bibliotheca Corviniana* is thought to have occurred in these years, as *Ugoletto*, who became curator of the library after *Galeotto* and *Fontius*, had exceptional good command of the Greek language. Because of the Greek manuscripts, the *Corviniana* had attained international recognition and served as an inspiration for the *Medicis* in Florence for establishing the famous *Bibliotheca Laurenziana*. The *Corviniana* employed full-time top-notch scribes and illuminators in the codex workshops of Buda, Florence, and Vienna. In 1490, the year of *Matthias*' death, there were 150 additional codices on order from Venice. The total number of volumes was estimated approximately at 2000–2500. With regards to size and topical wealth, it was surpassed only by the Vatican Library.

Matthias' successors (*Wladislaw II* and *Louis II*) practically did not add to the library because the treasury had become empty. Moreover they gave away many volumes of the *Corviniana Library* as gifts. Fortunately though, these volumes survived the Turkish onslaught (*Fig. 1,2*). When Buda fell to Sultan Suleiman in 1541, most of the Corvina codices was pillaged, taken to Istanbul, and wasted. Today only about 10 per cent of the original volumes of the *Corviniana Library* exist. These surviving volumes arrived after various adventures at different libraries all over the world (CSAPODI, CSAPODINÉ, 1990).



Fig. 1. (top) In the schematic map the area of Medieval Hungary is hatched. The smaller hatched area attached to Hungary and marked with an asterisk contains the lands conquered by *King Matthias* by 1490: Silezia, Moravia, Lower Austria, Styria and Carinthia.

Fig. 2. (bottom) The same part of Europe as above one and a half century later at the time of the Peace of Westphalia. The Transylvania Principality — earlier part of Hungary — remained “independent” after the subjugation of the country by the Turks, became, however, tributary to the Sultan.



The astronomical codices

The Corviniana Library offered a fine selection of topics: philosophy, theology, history, rhetorics, astronomy, geography, medical science and military technology.

Twenty-six of the volumes that survived deal with sciences such as geography, architecture, military science, and botany or natural philosophy (e.g. the works of *Beda Venerabilis* and *Plinius*). Nine of them are on astronomy. The ratios regarding the topical distribution of the remaining volumes are not necessarily a true reflection of the make-up of the original *Corviniana Library*. Let us now look at the works on astronomy, from that period.

Among the astronomical volumes there are two *printed books* as well. They should also be mentioned briefly. One is the *ASTROLABIUM* by *Johannes Angeli* published in Augsburg in 1488. It deals with the instrument generally used for quick determination of the positions of the planets which were used in horoscope making. The book is now in Pierpont Morgan Library in New York.

The second printed book which is a collection of several ancient astronomical papers is the *ASTRONOMICORUM LIBRI* by *Julius Firmicius*. It was published in 1499 (nine years after the death of *King Matthias*) in Venice and was decorated with the emblem of *Wladislaw II*, the successor of *King Matthias*. It is now in Uppsala, Universitetsbiblioteket.

The following two codices were in possession of *Wenceslas of Luxembourg, King of the Czeches*. Both were made around 1400 in Prague. After *Wenceslas*' death, his brother, *Sigismund of Luxembourg, King of Hungary* inherited them. Ultimately the codices ended up in the library of *King Matthias Corvinus*. The books have some features in common, e.g., the writing in them is Gothico-textual and the coat of arms of the *Luxembourgs*' had been overpainted with the one of *King Matthias*.

The author of the *COMMENTARIUS IN PTOLEMEI QUADRIPARTITUM* (*Fig. 3*) is the Egyptian *Haly Aberudiam (Ali Ibn Ridwan)*, 998–1061. He lived in Cairo an outstanding spiritual centre of the *Fatimid* rulers. He was well trained in medical sciences and in astronomy, as well, and wrote commentaries on the works of *Galen*, *Hippocrat* and *Ptolemy* (SARTON 1975, pp 729–731). The original Arabic text was first translated into Spanish and then into Latin 1990). Today it is in the Nationalbibliothek in Vienna. (CSAPODI, CSAPODINÉ, 1990).

The *PHILOSOPHIA* by *Wilhelmus de Conches* is the second *Corvina* codex which came from Prague. The author (1080–1154) was born in Normandy, studied in Chartres, and later became professor in Chartres and Paris. In his youth he wrote the treatise *De philosophia mundi*, which is one of his fundamental works (SARTON, 1975, pp 197–198). The topic of the book is astronomy and natural philosophy. According to Sarton, Conches tried to make distinction between astrology and astronomy in his works as early as in the 12th century. He sought for rational solution of cosmological problems. The codex is in Madrid in the Biblioteca Nacional.



Fig. 3. Title page of the codex *Haly Aberudiam Heben Rodan: Commentarius in Claudii Ptolemaei Quadripartitum ex Arabica lingua in Hispanicam et iussu Alphonsi X regis Castiliae, opera Aegidii de Thebaldi in Latinam translatus*. The miniature at the beginning depicts Wenceslas the King of the Czeches.

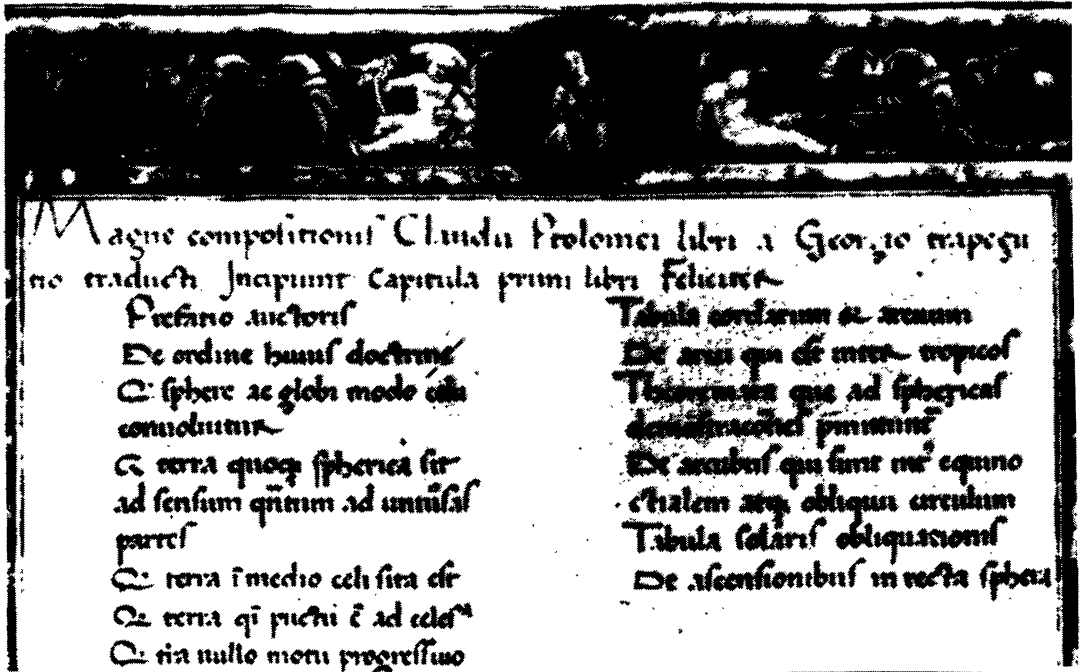


Fig. 4. Part of the Content of the first book of the *Magna Compositio*... or *Almagest* translated by *Trapezuntius*. The first item on the right side is the *Tabula cordarum atque arcuum*. Both *Peuerbach* and *Regiomontanus* omitted the use of cords and arcs in the *Epitome Almagesti* and substituted them by trigonometric functions.

A rudimentary work in astronomy is the *MAGNAE COMPOSITIONIS LIBRI* (seu *ALMAGEST*) by *Claudius Ptolemaios*. A Latin translation of the original Greek text made by *G. Trapezuntius*, was among the volumes of the *Corviniana Library* (Fig. 4). The Latin text was much criticized because of its inferior quality. Bound in leather in the Italian Renaissance style and its ornamentations prepared in Buda, this codex was completed by 1467, the year *Regiomontanus* came to Hungary. Today, the codex is in the Nationalbibliothek in Vienna.

The *STELLARIUM* by *Johannes Tolhopff*, (astronomer, poet and mathematician) is a book written by a contemporary scholar. The author began his studies in 1465 at the University of Leipzig. It is almost certain that he personally knew *Regiomontanus*, who lectured in 1466–67 at this university. From 1472 to 75 *Tolhopff* was professor of the newly-founded Ingolstadt University. In 1476 he presented *Pope Sixtus IV* his work on planetary motion "*De motibus celestium nobilium*" in Rome. The celestial positions were referred to the Rome meridian. An example is calculated for 15th October, 1476 (ZINNER, 1968).

At the invitation of *King Matthias* in *J. Tolhopff* came to Buda from the University of Leipzig 1480. He offered the King a treatise similar to the one he had presented to the Pope (Fig. 5). This work was a simplified table of

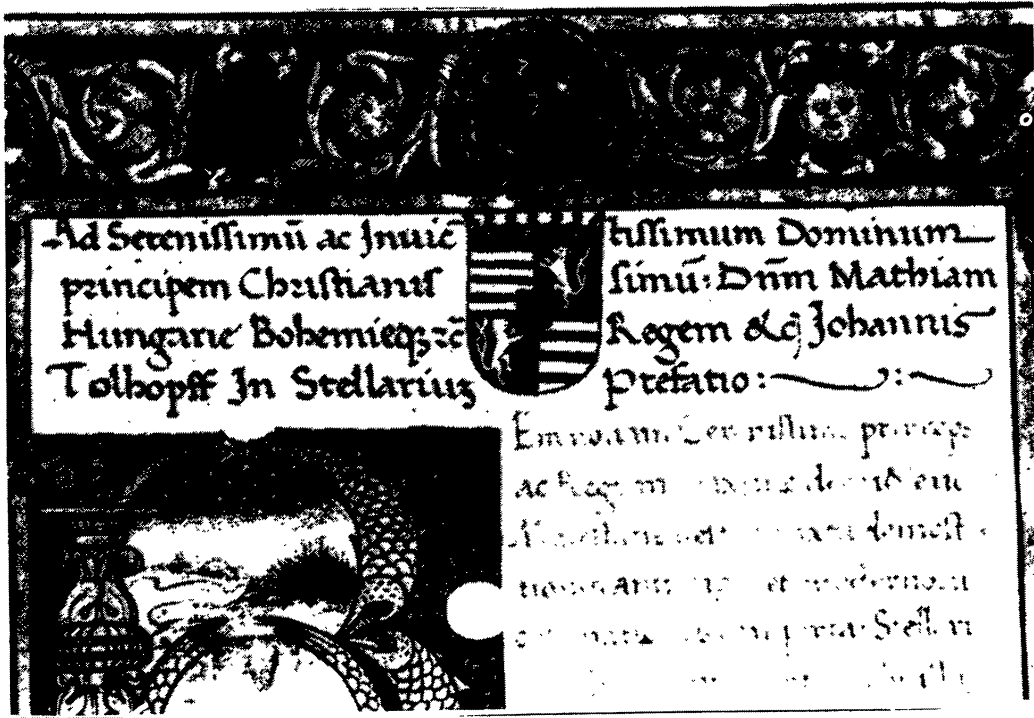


Fig. 5. Beginning of the Preface of *Stellarium* by *Johannis Tolhopff*: “Ad Serenissimum ac Inuicissimum Dominum principem Christianissimum Mathiam Hungariae Bohemiaeque Regem”.

planetary motion, based on the geocentric view of the Universe and it provided orbital data for the Buda meridian from 1463 on for the next 49000 years. The specific example was calculated for the 6th of May, 1480 (ZINNER, 1968). *Tolhopff* was elevated by *Matthias* into the ranks of the Hungarian nobility as a reward for his accomplishments.

From the manuscript a codex was prepared in Buda. Two of the miniatures on the title page are worth mentioning. One of them represents the Roman God Janus. Janus was also placed into the coat of arms of *Tolhopff*. A copy of the certificate of *Tolhopff*'s nobility was discovered by chance several years ago in Vancouver, in the library of the University of British Columbia (CSAPODI-GÁRDONYI, 1988).

An other miniature depicts Heracles killing the Hydra of Lerna. This picture should refer to the king himself. As a result of his victorious warfare against the Turks *King Matthias* became a metaphor for the mythological hero. The peoples of Europe who were terrified of the Turkish threat trusted him. The parallels *Matthias-Heracles* and the *Turks-Hydra* were quite obvious in that epoch (CSAPODI-GÁRDONYI, 1988). The codex is in Wolfenbüttel in the Herzog August Library.

It is a long story how the EPITOME ALMAGESTI came into being. Born in Greece (1403) and supported by his talent, *Bessarion* was nominated the Archbishop of Nikaia in 1438. A strong advocate of the reunification of the Roman and Eastern Churches, he became a cardinal in Rome a year later. In his palatial mansion of the Via Ergatia at the foothills of the Quirinale, he surrounded himself with a group of humanist scholars debating and discussing the latest literary works. He had an enormous book collection and was personally involved in translating old Greek manuscripts.

Bessarion arrived in Vienna in May 1460, as a papal legate with the ultimate goal of gaining Germany's support for an anti-Turkish military crusade. He made acquaintance with *Georg Peuerbach*, a professor of Vienna University, and commissioned him with the preparation of an easy-to-read, condensed Latin version of *Ptolemy's Almagest*. The professor eagerly jumped at the task, for he was familiar — almost verbatim — with *Ptolemy's* work in the 12th century Latin translation of *Gherard da Cremona*. Peuerbach succeeded in completing the first six books from the thirteen books of the *Almagest* by 1461, when he died. On his death bed, the professor made his disciple *Regiomontanus*, swear that he would dutifully complete the task. Shortly thereafter, *Bessarion* returned to Rome, taking along *Regiomontanus* who, thanks to his efficiency, completed the excerpt of the manuscript in 1462.

Regiomontanus owned a copy of the *Cremona* translation as well as the contemporary Latin version of *Trapezunt* (prepared to oblige with the wishes of *Pope Nicholas V*). As noted above, the latter left much to be desired and was vehemently attacked by *Bessarion's* scholarly circle. ZINNER, (1968) argues, that *Regiomontanus* based his *Epitome* on the *Cremona* text. According to CSAPODI, CSAPODINÉ (1990) *Regiomontanus* used the original Greek text.

Undeniably, the EPITOME ALMAGESTI in *Regiomontanus* condensed compilation did not replicate the old Greek text and its contextual meaning did not track the original work. Rather, he created a qualitatively different manual with a new investigative perspective on astronomy. By virtue of its structure, the text had provided incentive for further research in this discipline. Indeed, both *Copernicus* and *Galilei* used it as a textbook (ZINNER, 1968).

This work of *Regiomontanus* originally was dedicated to *Cardinal Bessarion* (Fig. 6). An ornate replica was prepared in 1476. That this codex was part of *Queen Beatrice's* library is evident from the unification of the *Corvinus* and *Aragonian* emblems according to the custom of the Hungarian queens (Fig. 7). Crafted in Florence in the style of the *Cherico* workshop, today the volume is in Vienna (CSAPODI, CSAPODINÉ, 1990).

One of the works *Regiomontanus* completed in Hungary is the TABULAE DIRECTIONUM PROFECTIONUMQUE... One year after his arrival he presented and dedicated the manuscript to *J. Vitéz*. The archbishop was in high esteem at *Regiomontanus* before he received the archbishop's invitation to the country. In one of his lectures — given at the Padova University on astronomy,

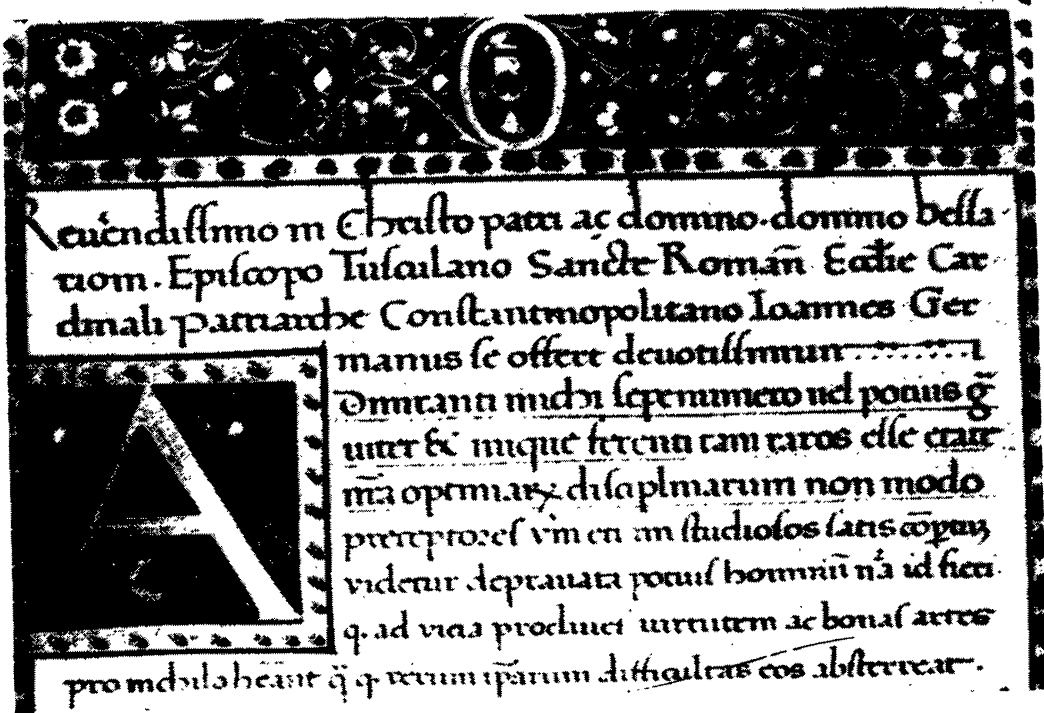


Fig. 6. Top of the first page of the *Epitome Almagesti* with the devotion: *Reuerendissimo in Christo patri ac domino, domino Bessarioni, Episcopo tusculano Sanctae Romanae Ecclesiae Cardinali patriarche Constantinopolitano Ioannes Germanus se offert deuotissimum...*

mathematics, music and physics in 1464 — he enumerated *J. Vitéz* among the dignitaries of the Church who were fostering astronomy (ZINNER, 1968).

The codex contains 32 tables. One of them, the “Declination of the Sun” pro each single degree of the ecliptic, was prepared during the author’s stay in Padova. All the others, however, were calculated in Esztergom in the archbishop’s palace with the assistance of the Polish humanist *Marcin Bylica z Olkusz*. The tables served to make horoscope casting easier (BARLAI et al., 1992). As Regiomontanus writes in the Preface “*tables useful and easy to handle*” were ordered by the archbishop. At the beginning of the Preface there are some obligatory compliments directed to *Vitéz*, but later the text turns into professional explanation. The outstanding astronomer of the century regards the archbishop as a partner and explains to him — as to an expert on his own level — the new method he introduced to calculate the “houses”, evaluates and criticizes the methods of the predecessors, among them the one of *Haly Aberudiam*.

This partnership can be best characterized by the last sentences of the Preface: “*Tantam igitur utilitatem praesul dignissime directionum tabulae afferent, quas petebas, in quacunque regione latitudinem 60 graduum non*

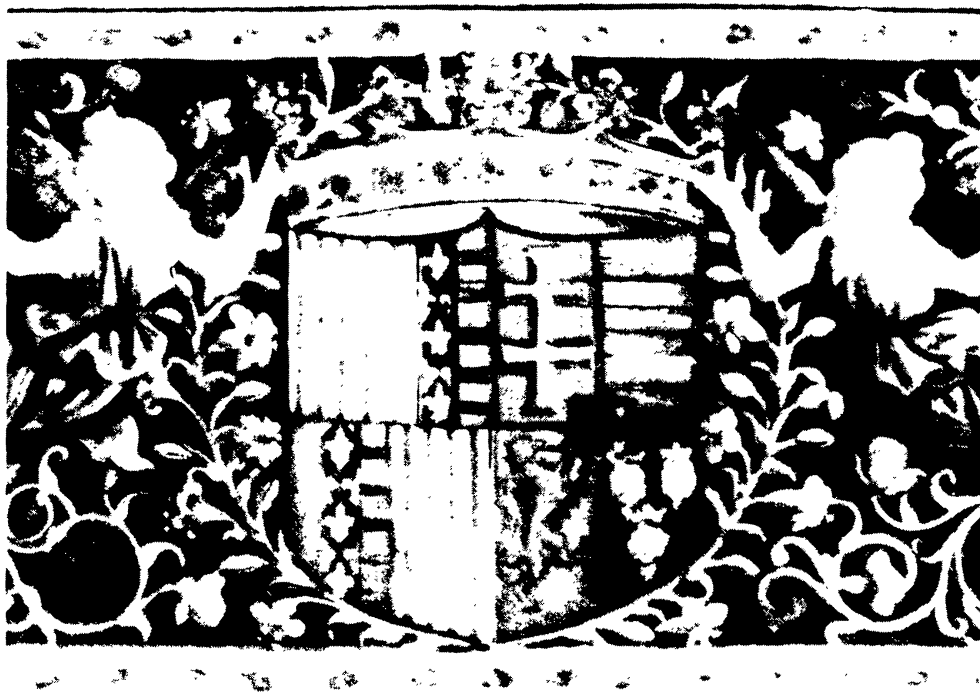


Fig. 7. The unified Corvinus and Aragonian emblems in the bottom of the title page of the *Epitome Almagesti*.

excedente, sive significator dirigendus in itinere solari existat, sive ab eo versus alterum polorum secedat, in quibus maximum Solis ab Aequatore suppositi declinationem trium et viginti graduum cum dimidio, observationibus modernis maiorem non admittentibus. In omni demum regione duodecim coeli domicilia constituere, ac in eis stellas distribuere, aliaque plurima scitu iucundissima per hasce tabulas addiscere licebit. Eas itaque primicias operum meorum suscipere digneris, quas ubi pro acumine ingenii tui probaveris, in publicum prodire iubeto. Vale praesulum decus."

This work of *Regiomontanus* was published in printed version 11 times between 1490 and 1626. The codex is now in Wolfenbüttel, in the Herzog August Bibliothek. There are merely assumptions how the codex got from the archbishop's possession into the Corvina codices (CSAPODI, 1972). Though the codex is decorated with the coat of arms of King Matthias, the king did not confiscate the famous library of *Vitéz* after discovering the plot *Vitéz* organized against him (CSAPODI-GÁRDONYI, 1984)

The TABULA PRIMI MOBILIS was completed by *Regiomontanus* in the royal court and was dedicated to the king (*Fig. 8*). It deals with spherical triangles formed by different main circles in the "primum mobile", thus in the celestial globe as we would say today. The distances of the celestial bodies from a given main circle or from each other can be represented as a side of a spherical

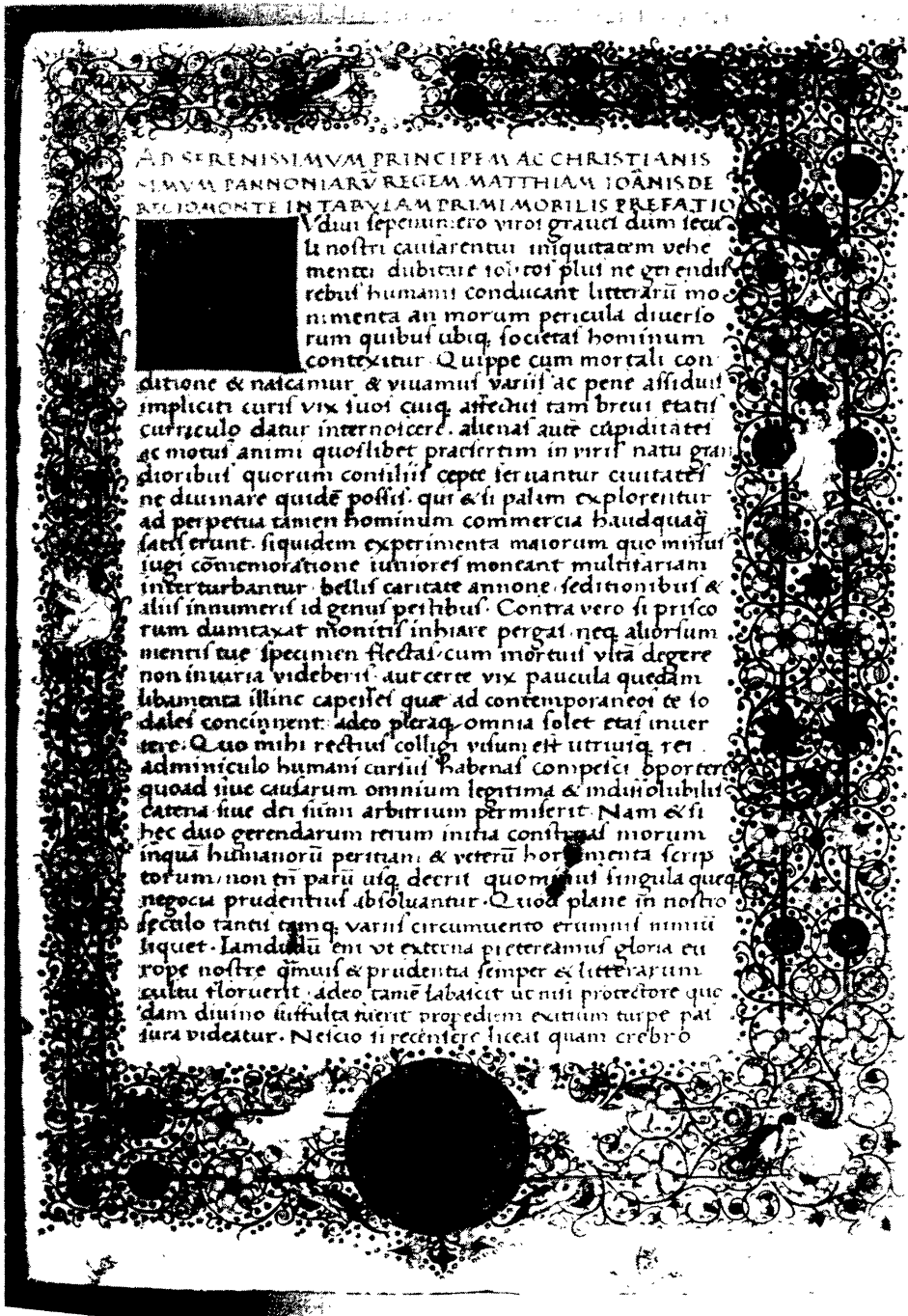


Fig. 8. First page of the Codex Tabula Prima Mobilis devoted to King Matthias

triangle and so can be yielded as the product of the sines of two angles in the spherical triangle. The commencement of this work is dated at 1463 in Venice, where *Regiomontanus* stayed in the service of *Cardinal Bessarion* (ZINNER, 1968).

In his correspondence with *G. Bianchini* in Ferrara, *Regiomontanus* mentioned several times that the tables were being prepared. *Regiomontanus* and *Bianchini* maintained a correspondence for about two years sending each other astronomical and mathematical puzzles and problems to solve. *Bianchini* referred several times to his own astronomical tables advising to use them. *Regiomontanus*, however, tactfully avoided doing so, because *Bianchini* used an obsolete value in them for the tilting of the ecliptic, while *Regiomontanus*' calculations were based on the correct value (see the Preface of the *Tabulae directionum*). The explanation to the use of the *TABULA PRIMI MOBILIS* consists of 63 chapters.

The Preface is worth mentioning. Its style differs completely from the one of the *Tabulae directionum*'s. *Regiomontanus* addresses the king as a possible defender of Europe from the Turkish menace: "... *gloria europe nostre quaevis et prudentia semper atque litterarum cultu floruerit adeo tamen labefacit ut nisi protectore quodam divino suffulta fuerit propediem exitium turpe passura videatur.*"

The Turks are represented by the metaphor of a dragon vomiting poison: "*Quantus draco iste lunari silva latitans virus undiquersu evomat, quis quod horrifico strepitu vicinas territet urbes quam perniciose nihi arceatur olim eruptus sit.*"

The author further claims he was proud of his work, and that its accuracy will remain the same even 1000 years later. The first printed version of the *Tabula* was published in 1514. As little as one century had elapsed when *Napier*'s "*Mirifica logarithmorum descriptio*" containing the logarithms of the sine from 0–90° made the laborious multiplication of the sine values by simple addition superfluous.

This is the *only astronomical Corvina* which is today in Hungary. It is in the the National Széchényi Library.

Some concluding remarks

In 1452 the Austrian Emperor *Friedrich III* visited Italy. He took *Giovanni Bianchini* in his service, and raised him to nobility. In the coat of arms of *Bianchini* an armillary sphere was situated beside the imperial eagle. The grateful *Bianchini* dedicated a work to the emperor, a good compilation of the results of the calculations that had existed before. *Johannes Tolhopff* had also been ennobled by *King Matthias* for the manuscript of the *STELLARIUM* devoted to him.

It is conspicuous how easily the benevolence of the rulers could be gained by humanist scholars representing the good average level in contemporary astronomy. *Regiomontanus* was an outstanding personality in astronomy, his impact

was seriously felt in the scientific development of the subsequent century as well. *Zinner* describes him as a man who with his doubts concerning the classic planetary theories paved the way for Copernicus. He was never awarded, however, any recognition of this type. He may not have longed for being recognized this way. In his comprehensive monograph *Zinner* (1968) depicts him as a humble and modest character. (*Regiomontanus'* relationship with *King Matthias* seems to be ambiguous. He came to Hungary on the invitation of *Archbishop Vitéz*, although later he spent some time in the royal court as well. *King Matthias* rated him highly. Still, the discovery of the plot organized by *Vitéz* against the King in 1471 and the following custody arrest of the archbishop must have been an embarrassing situation for him. This fact presumably motivated his quick departure from Hungary to Nuremberg.)

There are views, according to which the role of *Regiomontanus* has been overrated by European scholars (THORNDIKE, 1929). According to SHANK, (1982) his mentality was deeply rooted in the medieval astronomy, he was a transitional phenomenon between the Middle Ages and the Renaissance. At any rate, the content of the codices *Tabulae directionum...* and *Tabula primi mobilis* prepared in Hungary, and the *Epitome Almagesti* preserved in the library represent the highlight of the 15th century astronomical literature. A Renaissance library could have boasted about them, and any contemporary library can be proud of them, too.

It is considered fortunate, indeed, that valuable texts from that period survived along with ancient and medieval masterpieces. It merely depended on chance which codices of the Corviniana Library succeeded in surviving the Turkish devastation. Fate acted blind and did not select according to the content and quality of the codices. Even then we are entitled to assume that the volumes that perished were also of the same high quality as those that remained from the library of *King Matthias*.

ACKNOWLEDGMENT. The authors are deeply indebted to Dr. L. Pócs and Mr. K.C. Barlay for their valuable help in preparing the manuscript. Thanks are due to Mr. P. Decsy for the photographs.

Present location of the codices

HALY ABERUDIAM (ALI IBN RIDWAN), *Commentarius in Ptolemei Quadripartitum*, Vienna, Österreichische Nationalbibliothek, Cod. Lat. 2271

JOHANNES ANGELI, *Astrolabium*, printed in Augsburg, 1488, New York, Pierpont Morgan Library, PML 55. I. 75

WILHELMUS DE CONCHES, *Philosophia*, Madrid, Biblioteca Nacional, Res. 28 Fol. 1^r

JULIUS FIRMICIUS, *Astronomicorum Libri*, printed in Venice, 1499, Uppsala, Universitetsbiblioteket, Collijn 1338

- CLAUDIUS PTOLEMAIOS, *Magne compositionis Claudii Ptolemei libri a Georgio Trapezuntio traducti (Almagest)*, Vienna, Österreichische Nationalbibliothek, Cod. Lat. 24
- IOANNES GERMANUS (REGIOMONTANUS), *Epitome Almagesti*, Vienna, Österreichische Nationalbibliothek, Cod. Lat. 44
- IOANNES DE REGIOMONTE, *Tabulae directionum profectionumque...*, Wolfenbüttel, Herzog August Bibliothek, COD. GUELF. 69.9 Aug. 2° Fol. 1^v
- IOANNES DE REGIOMONTE, *Tabula primi mobilis*, Budapest, National Széchényi Library, Clmae 412
- JOHANNES TOLHOPFF, *Stellarium*, Wolfenbüttel, Herzog August Bibliothek, COD. GUELF. 84.1 Aug. 2° Fol. 1^r

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