

tourism

Warmia of Nicolaus Copernicus



One can try to demonstrate that Copernicus as mathematician cannot measure up to Ptolemy or Kepler, but being a sensitive visionist who speeded up the scientific resolution, Copernicus is a genius of cosmology and very few can fall into line with him.

Owen Gingerich,
American astronomer
and science historian



AN INVITATION to a hike along Nicolaus Copernicus Trail

Nicolaus Copernicus – the most famous inhabitant of Warmia. The astronomer, mathematician, physician, lawyer, economist, creator of heliocentric theory and one of the 16th century forerunners of modern science. After his death, Copernicus was buried in a humble, anonymous tomb; today his tombstone is suitable for the cosmology genius. The Moon and Mars craters were named after him and Copernicium (Cn) – an artificially created and the heaviest currently known chemical element, named in the honour of the astronomer – was included in the periodic table in 2010.

Although Copernicus' name is known in the whole world, few people know anything about his life, apart from the stereotyped sentence that he stopped the Sun to move the Earth. However, getting to know the life of the famous Warmia inhabitant can be facilitated by following the Copernicus Car Trail. It leads, among others, to Olsztyn, Lidzbark Warmiński and Frombork – the cities which are still enlivened by Copernicus' spirit and in which the astronomer spent numerous months of his life. It was here that Copernicus created his theory and wrote his revolutionary works: *The Commentariolus* and *On the Revolutions of the Heavenly Spheres*.

But among the places worth visiting there are not merely major cities along the trail but some smaller towns as well – picturesquely located, with interesting monuments. A specific remembrance of Copernicus are villages in which the canon carried out location during his post as an administrator.

Therefore, feel invited to Warmia and follow the astronomer's footsteps!

The Frombork panorama, photo D. Zaród





CHAPTER I. About Copernicus

Meditations of a man devoted to philosophy may be far from the notions of the common people, as his task is to vindicate truth in all things.

Nicolaus Copernicus, *On the Revolutions of the Heavenly Spheres*

A VERSATILE RENAISSANCE MAN



In Olsztyn Copernicus is still looking into the sky,
photo GEP Chroszcz

Nicolaus Copernicus spent the majority of his adult life in Warmia – he lived and worked there for 40 years as a canon of the cathedral chapter. During this time period, Copernicus held various functions: he was a Bishop's secretary, a physician, an administrator, a general administrator and an inspector. He devoted all his spare time to astronomy which was

his passion. Far from the university centres he was observing the stars, contriving new universe order and writing his works, including the most renowned *On the Revolutions of the Heavenly Spheres*.

Hardworking and solitude preferring Copernicus considered Warmia, which he used to call 'a remote corner of the world', to be his real home. Thanks to the income connected with his clerical rank, he was able to spend time doing what he loved most – philosophising. In Copernicus times, it simply meant constant development of one's own interests. Although Copernicus is nowadays remembered first and foremost as an astronomer, he was also an ancient Greek language translator and a physician; he wrote a treatise on undervaluing money, dealt with the problem of the increasing bread price and – meanwhile – he drew up a couple of maps.

He was a true Renaissance man. A man with a mind open to new ideas, but modest and uninterested in privileges at the same time. His whole life, described in the Copernicus Trail, is a proof of these virtues.





WARMIA OF THE BISHOP AND CHAPTER

Warmia is a land in the Łyna and Pasłęka River basins. It encompasses the area stretching from the Vistula Lagoon, towards south-west, up to Reszel and Biskupiec as well as Łańskie Lake. At the times of Nicolaus Copernicus, the Warmia territory was inhabited by less than 100,000 people and it constituted the Warmian Bishop's and the chapter's dominium. The Bishop held two-thirds of the territory (the capital initially used to be located in Braniewo, then – in Orneta since 1341, and in Lidzbark Warmiński since 1350), and the Frombork cathedral chapter held one-third (Frombork, Olsztyn and Pieniężno vogt [komornictwo]). The Bishop and the chapter exercised both secular and church authority over their territories. In 1466 the Warmian dominium was included into the Republic of Poland, however, it maintained its autonomy to a large extent. It ceased to exist in 1772 when its territory underwent the Prussian partition.

EDUCATION AND WORK – THE LIFE OF NICOLAUS COPERNICUS

Among numerous and various sciences and arts enervising a human mind, those – to my mind – deserve to dedicate yourself to above all [...], which deal with most beautiful things [...].

Nicolaus Copernicus, *On the Revolutions of the Heavenly Spheres*

Nicolaus Copernicus **was born on 19th February 1473** in Toruń. He was the youngest of the four children of a merchant called Mikołaj (Nicolaus) and Barbara nee Watzenrode. When he was 10, his father died, and a few years later – his mother deceased as well. Nicolaus

and his brother Andrzej were taken care of by an influential uncle – Lucas Watzenrode (see p. 3), the Warmian Bishop. **In 1491** the uncle sent the boys **to study in Cracow**.

Nicolaus enrolled into the liberal arts department of the Cracow Academy. Classes were rather general – students were reading both poetry and scientific works, they attended Latin and Theology as well as Optics, Geography or Surveying classes. The Academy employed a number of distinguished science lecturers and young Copernicus was especially interested in astronomy which was flourishing in



Collegium Maius in Cracow where Copernicus studied, photo M. Zaręba



Toruń – the Copernicus' hometown, photo D. Zaród

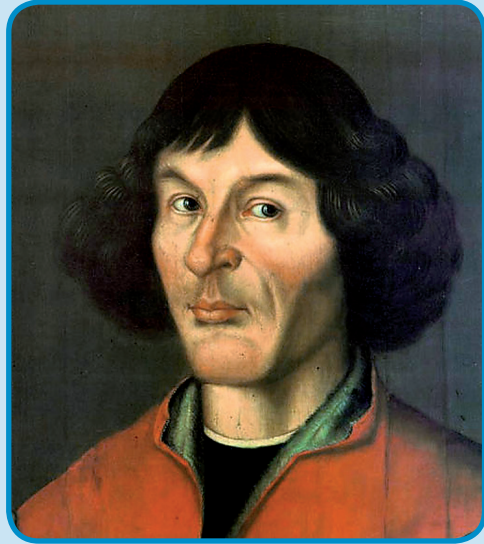


WHAT DID COPERNICUS LOOK LIKE?

He was slim and tall, with a long face surrounded by chestnut curls and with well-shaped lips as well as a large nose. . . That's how can see him in the portraits. There are few images of the astronomer from the past times; however, none of them was created during his lifetime. On the other hand, those images must have been imitations of some previous paintings, to which, as it is assumed, the person concerned was posing himself.

The oldest preserved portrait of the astronomer is located in Strassbourg – it was painted in ca 1574 and it has been decorating the sun dial of the Strassbourg cathedral tower until today. Nonetheless, the most popular portrait of the astronomer can be found in the District Museum of the Toruń city. The painting dates back to 1580 and presents Copernicus, who is then about 40 years of age, wearing a characteristic red, sleeveless, fur-lining garment. Copernicus' most contemporary image was came into being on the basis of the analysis of the astronomer's skull which was found by archaeologists in the Frombork cathedral only in 2005. Computer visualisation presents a 70-year-old canon. Grey hair and wrinkles do not change the feeling that the visualised man is the same person as the one presented in the Toruń portrait.

Nicolaus Copernicus – the 'Toruń' portrait of 1580, photo archives of Wikimedia Commons



Castle in Lidzbark Warmiński,
photo GEP Chroszcz

Cracow at that time. Nicolaus did not graduate from the Academy though, as his uncle summoned for him to Lidzbark Warmiński in 1495, after 4 years of studies in Cracow, with an intention to appoint him a canon in Frombork.





NICOLAI COPERNICI TORINENSIS
DE REVOLUTIONIBUS ORBIS
UM CAELI LIBRI VII.

Habes in hoc operam recens nato, & aedito,
studio lector, Motus stellarum, tam fixarum,
quam erraticarum, cum ex uteribus, tum etiam
ex recentibus observationibus retulit: & no-
tis insuper ac admirabilibus hypothesibus or-
natos. Habes etiam Tabulas exactissimas, ex
quibus eodem ad quocumque tempus quam facili-
me calculare poteris. Igiture eme, lege, fructe.

Αναμνηστικὸν ἑξ ἑστίου.

Norimbergae apud Ioh. Petreium,
Anno M. D. XLIII.

THE FORBIDDEN BOOK – OR ON THE REVOLUTIONS OF THE HEAVENLY SPHERES

The main idea of Copernicus' work was disproving the geocentric model of Claudius Ptolemy (2nd century A.D.) based on the Aristotle's presumptions (4th century B.C.). According to Ptolemy's concept, a fully motionless Earth was the centre of the universe, around which the Sun other planets (including the Moon) were orbiting along concentric spheres. The remaining luminant objects in the sky – the fixed stars – were fastened to the firmament (determining the border of the universe), and orbiting around Earth along with the firmament itself.

Copernicus replaced Ptolemy's theory with his heliocentric model. To his mind, it was the Sun which constituted the universe centre and the Earth was merely one of several planets revolving around it. Copernicus assumed that planets were moving along circular orbits (in reality their orbits are elliptical) and that, apart from the annual motion around the Sun, the Earth was also revolving around its own axis on a 24h basis. The first person ever claiming that it was the Earth which circled around the Sun was Aristarchus of Samos (3rd century B.C.). His views, however, were not appreciated and the heliocentric theory was given up for many centuries. It was only Nicolaus Copernicus' work which fully formulated the theory.

Copernicus entitled his work *On the Revolutions*, however his publisher altered it into *On the Revolutions of the Heavenly Spheres* and such name was generally adopted later on. Initially, the Catholic Church did not oppose Copernicus' theory. It was already before the book was published, in 1533, that its model had been presented to Clement VII and it is clear that the Pope's reaction was favourable; other top-rank clergymen revealed positive attitude as well. In 1616 though, the Inquisition recognised heliocentricism to be in opposition to the Biblical cosmology and entered *On the Revolutions* into the *List of Prohibited Books*. Copernicus' work was crossed out from the list only in 1828. A few years later (1854) the first Polish translation of the book came into being (Copernicus wrote his treatise in Latin – the obligatory scientific language of his times).

Title page of the treatise *On the Revolutions* (ed. 1543), photo archives of Wikimedia Commons

In 1496 Nicolaus **left** Lidzbark once again. This time he travelled considerably farther – **to Bologna**, in order to study canon law. And although a year later Copernicus was admitted to the Warmian chapter, he did not decide to go back to Frombork but accepted canonry through his representatives. In year 1500, Copernicus arrived to Rome where he gave a lecture on mathematics. Next, **in 1501, he went to Padua** – in order to study medicine (see box p. 13) and **in 1503** he obtained doctor's degree in law at the **university in Ferrara**. Except one short break (returning to Frombork to take vows and become a canon), Copernicus stayed in Italy for eight years. Not only did he gain education there, but he developed his astronomical passion as well. It was in Bologne that he carried out his first observations of the celestial spheres.

At the end of **1503 Copernicus returned to Warmia** for good. He became a secretary and an assisting physician of his uncle, Lucas Watzenrode. **He settled in Lidzbark Warmiński**. It was at that time that he translated Greek letters of Theophylact Simocatta into Latin and worked out his first draft of the revolutionary universe construction, included in the *Commentariolus* (*Little Commentary*). (To find out more about the life of Copernicus at the Bishop's court go to part entitled *Lidzbark Warmiński...*, p. 12).

In 1510 Nicolaus Copernicus moved to **Frombork**. There he began writing down his great work – *On the Revolutions* (*De revolutionibus*). Apart from holding various office posts, Copernicus was preparing a map of Warmia and the western borders of the Royal Prussia; he was also invited to participate in the calendar reform. (To find out more about Copernicus' life at the Vistula Lagoon go to *Frombork...*, p. 17).

In **1516** the chapter voted Copernicus to become the administrator of its estates. This is how Copernicus **moved** to the **Olsztyn** castle. One of his duties was settling peasants on lands managed by the Frombork chapter (see p. 23). In Olsztyn Nicolaus became interested in economic issues, the result of which was his monetary reform project; during the Polish-Teutonic War (1520–21) he supervised the castle's defence. To find out more about Copernicus' life on the Łyna River go to *Olsztyn...*, p. 7).

In **1521 Copernicus returned to Frombork**. He was writing successive parts of his major work up until 1530. Even during the last few years of his life, Copernicus performed administrative duties as a supervisor of chapter testaments, a parliament deputy and the superior of the chapter's building society. He also advised the chapter on various matters and treated ill noblemen. It was still in 1541 that, at the age of 68, Copernicus set off to an arduous journey to Königsberg, summoned by Duke Albert to treat his seriously ill counsellor. At the end of 1542 Copernicus himself got seriously ill. After a stroke, he was paralysed and required constant care. **He died in May 1543**. The exact day of his death is being still under discussion (see box p. 19).



The Cathedral Hill walls,
photo GEP Chroszcz





The Warmian towns and cities connected with Nicolaus Copernicus' life and activities are included in the thematic car trail. The route is 232 km long. Information boards can be observed already in Olsztyn, after which the trail leads through Olsztyn, Dobrze Miasto, Lidzbark Warmiński, Orneta, Pieniężno, Braniewo and Frombork. Then the trail leaves Warmia and leads to Elbląg through Tolkmicko. The trail is marked with brown information boards with a characteristic image of an astrolabe. Apart from these, 40 additional information boards have been placed in some interesting places along the trail. Each board displays a map of a given area, the description of the place itself and some interesting objects around it, a schematic plan of the whole trail as well as photos of the described places.



CHAPTER II. Copernicus' cities – let's go!

OLSZTYN – THE SOLAR QUADRANT, THE MONETARY TREATISE AND FIGHTING AGAINST THE TEUTONIC KNIGHTS

Nicolaus Copernicus arrived at the Olsztyn **castle** in November 1516. He was to live and perform administrative functions there for three years. The castle with a fortified town, erected in the 14th century, constituted the strongest defence system among the Warmia chapter's estates. It also performed the role of a granary and the chapter's treasure house. In Copernicus' times, the castle consisted of two parallel wings connected by high walls, over which a cylindrical, huge tower dominated. Its northern wing was of a representative character and, apart from a chapel, it housed the administrator's apartment.

While holding his post, Copernicus was running a notebook in which he was writing down notes on his business trips to the administered areas. That is how we know that he undertook 71 trips (since 1516 to 1521) and visited 43 Warmian settlements (see p. 23). He finished his office in 1519. Copernicus returned to Frombork, but – as it turned out – not for long. The Teutonic Knights' invasion of Warmia resulted in his return to Olsztyn in January 1520. After a few months, in November the same year, Copernicus was offered the administrator's post again. This time, apart from his office duties, he had to defend the fortress against the Teutonic Knights,

SZLAK KOPERNIKOWSKI
<http://mazury.travel>

ZAMEK BISKUPOW WARMIANSKICH W LIDZBARKU WARMIANSKIM

SANATORIUM W STOCZKU KLASZTORNYM

ŻEKA LYNIA

KOŚCIÓŁ P.W. ŚW. BARBARY Z XIV W W ROGOŹNU

PROGRAM REGIONALNY
NAPRAWIANIE INFRASTRUKTURY

UNIA EUROPEJSKA
KROK W KIERUNKU
ROZWOJU REGIONALNEGO

One of the information boards along
Copernicus Trail





ADMINISTRATOR'S DUTIES...

...were numerous, and they included managing the chapter's estates both in Olsztyn and Pieniężno [Melzak] area. All estate inhabitants were under his authority – not only peasants, but also townsmen, noblemen, castle burgraves, etc. Copernicus stipulated and received rents, fixed feudal rents and corvée [labor required of villagers for public purposes], exempted farmers from payments, located new settlers, granted lands, and authorised transferring as well as selling land. He was also responsible for the proper armament, supplies and fortification of the towns and castles.

Eugeniusz Rybka, Przemysław Rybka, *Copernicus – the man and the thought*



The Olsztyn castle,
photo GEP Chroszcz

as the war with the order began in 1519. The Teutonic Knights reached Olsztyn at the beginning of 1521. The far-sighted Copernicus had managed to prepare the castle to their arrival. When the Teutonic Knights undertook an attempt to cross the town walls close to one of the city gates on 26 January, the Olsztyn defenders quickly managed to fight the enemy off. Although the fight ended

up in this small skirmish only, Copernicus was proclaimed the town's brave defender. A famous letter written by the canon to king Sigismund I has been preserved where Copernicus declares his faithfulness to the Polish monarch; it reads as follows: *As we would like to do what is appropriate for noble and honest people [...] – even if we were all to die.*

MIDDLE AGES' LUXURY

The administrator's apartment was – as befits such authority – rather luxurious. It had a decorated roof and... a private latrine (*dansker*). The latrine was enlightened by two small holes in the wall, from which a castle farm and a windmill on the Łyna River could be observed.

A medieval latrine, stuck to a wall a dozen or so metres above the ground, has survived until nowadays.



The astronomer administered in Olsztyn until November 1521. Later on, he returned there again as an auditor in 1524, 1531, 1535 and 1538.

At present, the Olsztyn castle hosts **the Museum of Warmia and Mazury** (ul. Zamkowa 2, phone: +48 89 5279596, www.muzeum.olsztyn.pl) with permanent exhibition devoted to the most famous inhabitant of these walls. The great astronomer's chamber is available for sightseeing. You can also see a one-of-the-kind relic there – the fragments of the personally made experimental solar quadrant (see further). It is the astronomer's only research tool preserved until our times.

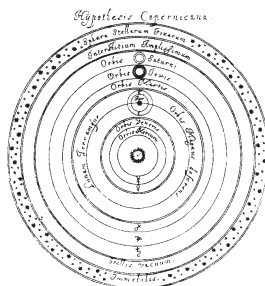
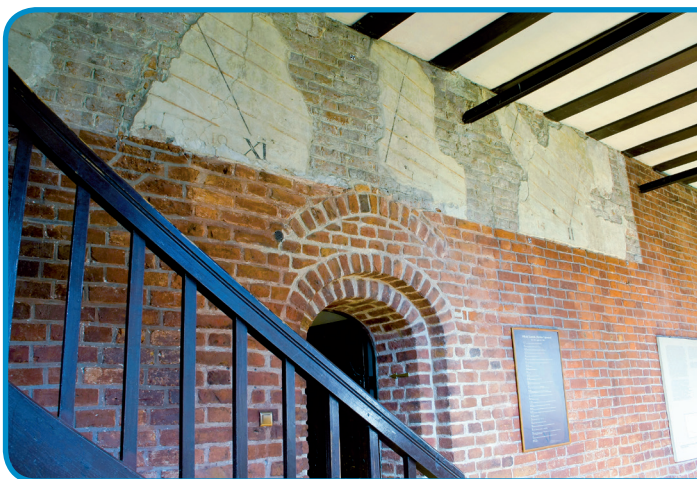
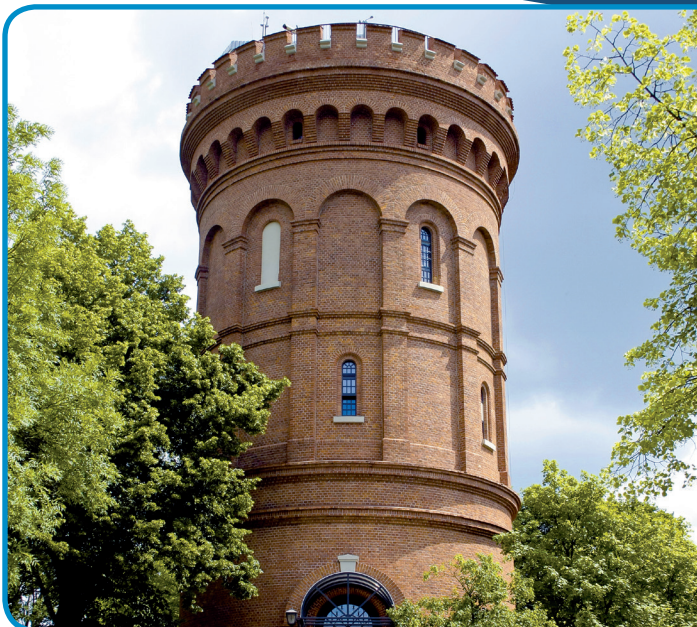
Olsztyn observations

And so the Sun manages the group of stars revolving around it, as if from the royal throne.

Nicolaus Copernicus, *On the Revolutions of the Heavenly Spheres*

Although the administrator's duties were very time-consuming, Copernicus did not give up on his astronomical research during his stay in Olsztyn. He continued his observations, not only those connected with his major work, but with the Julian calendar as well (see box). In 1517, in order to experimentally determine the date of equinox, Copernicus had the fragment of his brick wall, right above the Entrance to his apartment, covered with plaster and thoroughly smoothed out. After that, Copernicus himself marked the Sun's path by drawing a number of hyperboles on this carefully prepared board. A straight line determined the moment of the Sun's spring and autumn crossing of the equator.

Copernicus was also observing the planets' motion. It is generally known that he travelled from Frombork with his astrolabe. He probably run his observations from the tower, and specifically – from its top terrace.



Astronomical observatory in Olsztyn, photo GEP Chroszcz



Fragments of the experimental solar quadrant in the Olsztyn castle, photo GEP Chroszcz

The Copernican system – illustration of the work entitled *On the Revolutions*, photo archives Wikimedia Commons



CALENDAR REFORM

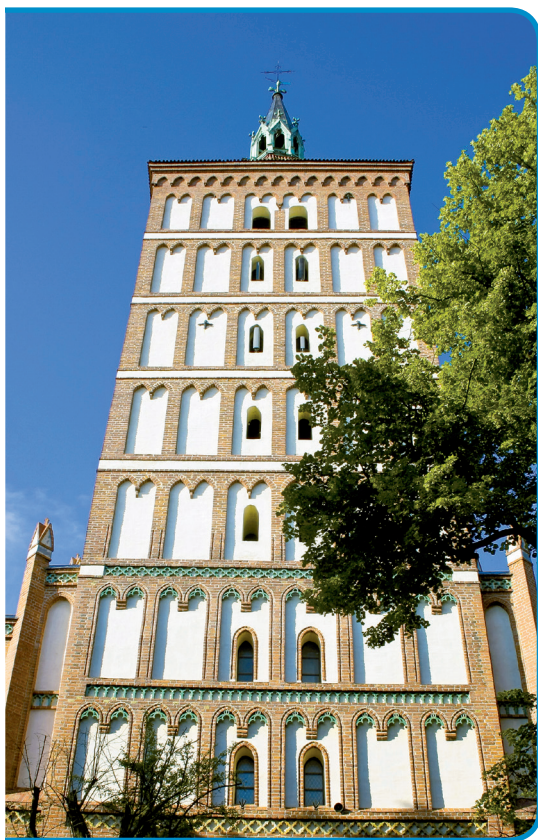
Since the times of Julius Caesar, Julian calendar (introduced in 46 B.C.) was widely used by people. It was created on the basis of an assumption that the length of the tropical year – that is the time between two subsequent moments of the Sun's crossing the point of equinox – equals 365 days and 6 hours. Therefore the calendar year consisted of 365 days, and every four years a leap year (366 days) was used in order to make calculations even. It turned out, nevertheless, that the tropical year is slightly shorter – specifically by 11 minutes and 14 seconds. The difference seems minute, but after a few hundreds of years it turns out to be considerable, especially for the Church which was specifying movable feasts' (mainly Easter) dates based on the equinox. The consequence of these discrepancies was constant regression of the spring solstice calendar date.

In year 325 the spring solstice took place on 21 March and it was this day that the Nicene Council determined to be the solstice date. In 16th century the equinox would occur already around 11th March. In order to get rid of the time difference, the Church undertook works on the calendar reform. Several scientists from various countries were asked for help. Also Nicolaus Copernicus was invited to participate in the works.

Finally, a new Gregorian calendar was introduced in 1582. In order to revise the delay which occurred since the Nicene Council, Pope Gregory XIII ordered that 10 days simply disappeared (the believers went to sleep on 4 October and woke up on 15 October). In order to prevent future delays, the principles of calculating leap years were slightly modified. Only Poland, Spain, Portugal and Italy accepted the reformed calendar straight after its introduction. Other countries decided to take the step slightly later (e.g. Prussia in 1610, Great Britain in 1752 and Russia – in 1918). Julian calendar, on the other hand, has been preserved as liturgical calendar in the Eastern Christianity tradition.



St Jacob's Cathedral tower in Olsztyn,
photo GEP Chroszcz



In December 1518 he was doing research into the location of Saturn and on the day of his birthday, 19 February 1520 – the location of Jupiter. It was also in Olsztyn at the beginning of 1520 that Copernicus undertook the final drafting of Book I of his famous work *On the Revolutions* (he started working on it already in Frombork). He created a catalogue of stars and his famous drawing of the Solar System.

Monetary and...bread reform

Although disasters, as a result of which kingdoms, duchies and republics usually deteriorate are numerous, however – to my mind – the most risky are: disagreement, mortality, land infertility and deterioration of the money value.

Nicolaus Copernicus, *The way to strike coin*

In 1517, in the castle chambers, Copernicus wrote his treatise entitled *On the value of coin*, the idea of which he developed later in his famous dissertation *The way to strike coin* (its final and full version dates back to 1528). Coins struck in excess in the Teutonic mint offices got debased and contained ever lower amount of precious ore, which resulted in large financial losses of the chapter and worsening of the Warmia inhabitants' living conditions. Coin losing its value, or – putting it into the modern language – the raging inflation – made Copernicus work on the financial reform. He opted for levelling the value of Teutonic and the royal coins as well as controlling mints by the Polish king.

Economic matters made Copernicus work out the so called *Olsztyn bread tax*. In his scientific treatise dated 1531, Copernicus set bread prices at the level accordingly to wheat



A COSMIC JOURNEY

There couldn't be a better place to get acquainted with Copernicus' passion than the Olsztyn **Planetarium** (al. Pilsudskiego 38, tel.: +48 89 5334951, www.planetarium.olsztyn.pl). Opened in 1973, to commemorate the 500th anniversary of Nicolaus Copernicus' birth, it is the second largest planetarium in Poland. The diameter of its dome reaches 15 m. Recently, the planetarium has been furnished with the most modern projection equipment, allowing its visitors to make an incredible journey to the very verge of the so far explored universe. The sensations are purely cosmic.

Planetarium in Olsztyn, photo GEP Chroszcz

and rye prices as well as flour weight and baked bread weight. *The true and fair weight and price of bread* – as he put in his dissertation – was to be in force not merely in Olsztyn but in other Warmian towns and cities as well.

The High Gate in Olsztyn, photo GEP Chroszcz



The city of Copernicus' times

After having visited the castle walls, it is worth taking a walk around a small but charming Olsztyn's Old City. There are a few buildings here which do remember – if not the Copernicus himself – then his times for sure. One of such buildings is the 14th century **High Gate** which nowadays constitutes the entrance to the Old City, and in the past – used to be an element of the city fortifications. An **old Town Hall** (presently a public library) stands in the middle of the main market square. Its oldest part – the southern wing – dates back to the turn of the 15/16th centuries. Over the building, a huge figure of **St. Jacob's Cathedral** dominates. This beautiful Gothic church was erected in 14th century and its massive, 70-metre tower with plastered blind windows were added in 16th century.

*Going along the Trail to another Nicolaus Copernicus' city – Lidzbark Warmiński – we pass through **DOBRE MIASTO**. It's definitely worth visiting. Nicolaus Copernicus visited Dobre Miasto in 1538, during his tour around some chosen towns of the diocese with the newly appointed Warmian bishop – Johannes Dantiscus. Dobre Miasto used to be an important city at that time. A proof of that is the splendid **collegiate church of the Holy Saviour and All Saints** – the second largest Gothic temple in Warmia after Frombork. Its building complex encompasses a 14th century church overlooking the city and the collegiate buildings erected at the beginning of the 16th century. Another interesting building is the **Stork Tower** which, along with the town walls, defended city access in the Middle Ages.*



LIDZBARK WARMIŃSKI – THE HELIOCENTRIC THEORY OUTLINE, THE LOVE LETTERS TRANSLATION AND THE MEDICAL PRACTICE



Copernicus stayed at the Lidzbark **castle** on several occasions. He arrived here for the first time in 1495, having broken off his studies in Cracow. Copernicus' uncle, the Bishop of Warmia, Lucas Watzenrode, wanted to have his nephew near himself, as he was trying to arrange a post of a Frombork canon for him. Months passed, however, and the post was still unavailable. Thus, Copernicus set off to Bologna to study law, after which he travelled to Padua to learn medicine. He returned to Lidzbark in 1503 and became his uncle's secretary as well as a royal physician. A few medical books have been preserved with Copernicus' notes and prescriptions on margins. Unfortunately, they were taken away together with other precious manuscripts during the Polish-Swedish wars.

 Cloisters of the castle in Lidzbark Warmiński, photo GEP Chroszcz

The strongly fortified Gothic castle of Lidzbark has been the seat of the Warmian Bishops and the centre of dominium administration since 14th century. Its four wings surrounded the inner courtyard with the storeyed, arcaded cloister (preserved in an excellent condition until today). The first storey of the building performed representative functions and housed the Bishop's apartment.

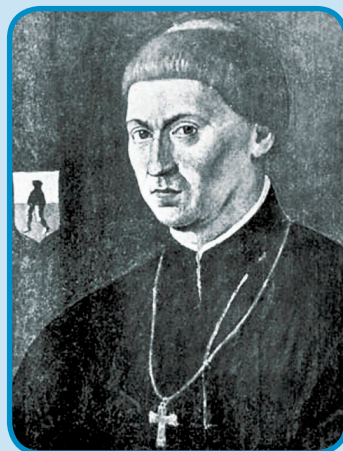
The strongly fortified Gothic castle of Lidzbark has been the seat of the Warmian Bishops and the centre of dominium administration since 14th century. Its four wings surrounded the inner courtyard with the storeyed, arcaded cloister (preserved in an excellent condition until today). The first storey of the building performed representative functions and housed the Bishop's apartment.

LUCAS WATZENRODE (1447–1512)

Nicolaus Copernicus' uncle and protector was one of the greatest Warmian Bishops. This thoroughly educated senator of the Polish Kingdom and advisor of three successive kings: John I Albert, Alexander Jagiellon and Sigismund I the Old, was a fierce opponent of the Teutonic Knights and plotted how to get rid of the Order from Prussia and transfer them to Podole. Deeply engaged in political issues, Watzenrode showed concern for getting Nicolaus acquainted with the complicated arcana of diplomacy craft (both state and church) during his nephew's stay at his court. Copernicus was therefore participating in a few conventions of the Prussian states (among others in Elbląg) and regional assemblies (*Sejmiks*), he witnessed the coronation of Sigismund I in Krakow and accompanied his uncle at the Congress of Poznań (1510) devoted to yet another attempt to alleviate Polish-Teutonic conflict.

Apart from political issues, Bishop Watzenrode was involved in economic and cultural development of Warmia. Out of his initiative, a cathedral school in Frombork was established and the Lidzbark castle owes him some wall paintings in domestic chapel. During his stay in Lidzbark, Copernicus could freely use the affluent resources of the Bishop's library.

Lucas Watzenrode, photo archives of Wikimedia Commons





Copernicus dwelled in the Lidzbark castle until 1510. After Watzenrod's death, he still visited the castle at various times, having been summoned to treat successive Bishops and their associates. Those visits, nonetheless, were rather short. The astronomer also paid a visit to Lidzbark in 1523, while holding a post of the Warmian diocese General Administrator.

The castle interiors are now housing the seat of the **Warmian Museum** (pl. Zamkowy 1, phone: +48 89 7652980, www.muzeum.olsztyn.pl). Available for sightseeing are, among others: the cellar, armoury, Bishop's apartments, refectory, castle chapel and the chapter house. A few interesting exhibitions have been set up in the beautiful interiors, e.g. the exhibition on the outstanding castle inhabitants.

Outline of the great theory

The Earth's centre is not the centre of the world but merely the centre of gravity and the centre of the Moon's track.

Nicolaus Copernicus, *The Commentariolus* [Little Commentary]

Numerous journeys made with his uncle as well as official duties, did not prevent Copernicus from developing his own interests. The first draft of his heliocentric theory, presented in the *Commentariolus*, came into existence within Lidzbark castle walls. It is not certain when exactly this small (in terms of volume) but revolutionary work was created – it is assumed it was written in ca 1509. The *Commentariolus* included Copernicus' 7 daring theses which were opposing almost the whole contemporary



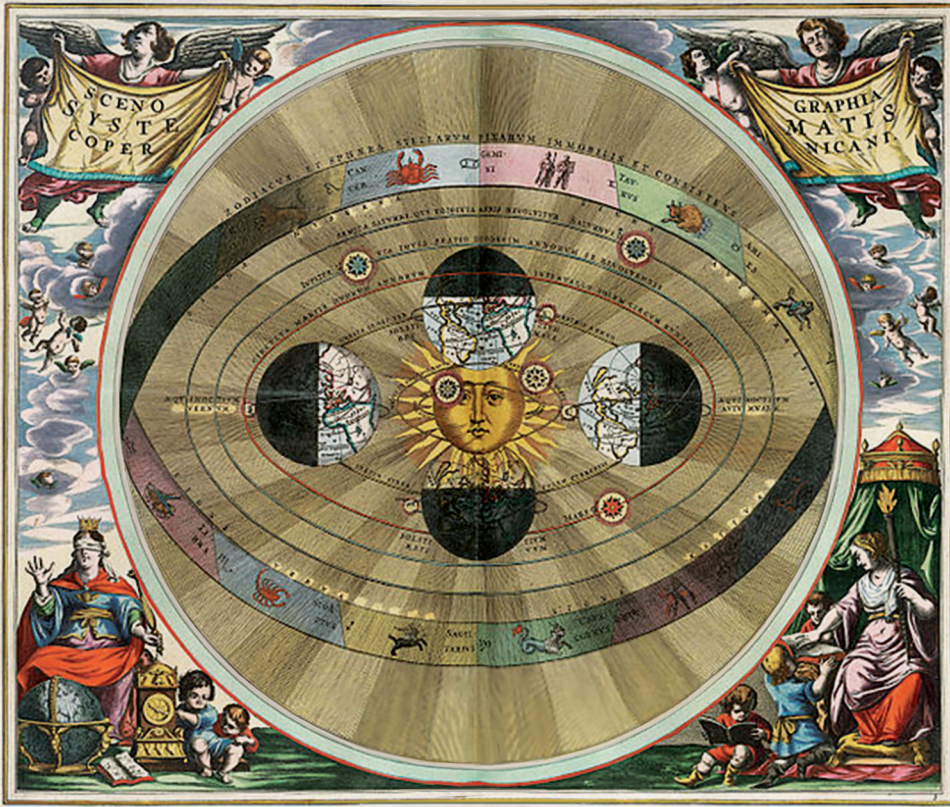
Wall paintings in the Lidzbark castle, photo GEP Chroszcz

Armoury in the Lidzbark Warmiński castle, photo GEP Chroszcz

COPERNICUS THE PHYSICIAN

In 1501 Copernicus enrolled to Padua university where he was studying medicine for two years. The academy was considered the best medical higher education institution in Europe at that time and it was famous for its excellent academic staff. Although it did not have the anatomy department yet, post mortem examinations were performed there in the students' presence. It was also the students' duty to assist professors during their visits to the patients. The curriculum also included herbs' healing properties and hygiene classes.

Copernicus did not graduate from the studies with a scientific degree. However, the obtained knowledge allowed him to run medical practice. He was considered to be a good physician. He was treating his all contemporary Warmian bishops and Frombork canons. He was also assuredly taking care of the patients in the Holy Ghost Hospital in Frombork (see p. 22). The preserved prescriptions prove that Copernicus fought illnesses with widely used resources; he was not enthusiastic about the ingredients which are now associated with superstitions (very popular in his times), such as frogs', snakes' or bats' body parts. That fact that Copernicus was known as a doctor is evidenced by numerous portraits presenting him with a lily of the valley, a symbol of medicine.



 Copernicus' heliocentric system
 by Anandreas Cellarius (1660),
 photo archives of Wikipedia Commons

knowledge on celestial spheres approved by the Church. It was in the *Commentariolus* that Copernicus announced for the first time that it is not the Earth which is the universe centre but the Sun and that the Earth revolves around the Sun as well as around its own axis. He also arranged the planets in the proper order and specified how much time they need to encircle the Sun (see box). Copernicus' calculations turned out to be largely correct.

The *Commentariolus* was not printed during Copernicus lifetime. However, the copies of his treatise circulated among European mathematicians and astronomers of the times. The work gained certain renown and it was probably due to this fame that

CELESTIAL SPHERES...

...encompass one another in the order presented here. The most distant is the sphere of fixed stars: immobile, comprising everything and including everything. Below there's Saturn, then Jupiter, and Mars; below there is a sphere on which people and the Earth are moving, next comes the Venus sphere and finally – Mercury.

[...] Saturn encircles the Sun for 30 years, Jupiter for 12, Mars for almost 2, Earth for 1 year, Venus – 9 months and Mercury – 3 months.

Nicolaus Copernicus, *The Commentariolus* [Little Commentary]



Copernicus was invited to cooperate on the Julian calendar reform (see p. 10). In the *Commentariolus* the astronomer also announced publishing his larger work related to the revolutionary theory in which he was to provide the readers with mathematical calculations and observational evidence. Gathering these data was what Copernicus was doing during the next between ten and twenty years in Frombork (see p. 21).

Literary exultation

One who seeks gifts does not love: Eros is incorruptible and so are the lovers taught by him.

Theophylact Simocatta, *Letters*, 42. *Pericles to Aspasia*

Copernicus' stay in Lidzbark brought about his debut as a poetry translator. Studying in Padua, the astronomer learnt ancient Greek which he needed for reading philosophical works of Euclid and Ptolemy. It was still in Padua that Copernicus started translating from Greek to Latin (the universal language of the European culture) the *Letters* of Theophylact Simocatta (born ca 560, death date unknown). He continued his translation work in Lidzbark. A collection of short works (social, rural and amorous themes) was enjoying popularity at that time, having been light and humorous reading of a satiric and moralistic character.

The translated work was published in 1509. It was the first translation of a Greek work in Poland. Copernicus turned out to be a skilful translator. His linguistic sensitivity was confirmed at a later time in his scientific writings, which were written elegantly and clearly. Copernicus dedicated the translation of the *Letters* to his uncle. His work was supposed to be, as he put it in an introductory note, a sign of gratitude to his uncle for all his beneficence. It was also his farewell. In 1510 Copernicus decided to leave his uncle's court and settle in Frombork.

A walk around the city

After having visited the castle, it's worth taking a walk around the Lidzbark Warmiński city centre. The local **St. Peter and Paul's church** dates back to 14th century. Standing out a mile is especially its massive tower covered by a light Baroque spire. Out of the city's medieval fortifications, a 15th century **High Gate** (the largest object of this type in Warmia and Mazury) and **fragments of the defence walls** have been preserved. In 1520, during the Polish-Teutonic War – the same war during which Copernicus was announced the Olsztyn defender (see p. 8) – the gate was the site of fierce fights when the city was besieged by the Teutonic Order's troops.

*Before we reach Frombork – yet another city connected with Copernicus' life and activities – we pass through a few other interesting places. A charming **ORNETA** was the seat of the Warmian Bishops for 9 years (starting 1340) before they moved to Lidzbark. Unfortunately, nothing has remained*

Theophilacti scolastici Simocati eptē morales: rurales et amatorie interpretatione latina;



Cover of the Theophylact Simocatta's *Letters* translation decorated with the Polish, Lithuanian and Cracow's coat of arms, photo archives of Wikimedia Commons

Church of St. John the Baptist and John the Evangelist in Orneta, photo GEP Chroszcz





📷 Splendorous interior of the church in Orneta, photo GEP Chroszcz

St Peter and Paul's church in Pieniężno, photo fotowojcik.pl

from the clergymen's residence. What did remain, however, is a 14th century **church of St. John the Baptist and John the Evangelist**, considered to be one of the most interesting churches in Warmia. Its shape is untypical – seen from the outside it reminds more of a hall than a temple. Equally interesting is a Gothic **Town Hall** with the oldest Warmian bell (1384). And Copernicus? It is known that he visited Orneta in 1538, while assisting Johannes Dantiscus during his tour around the dioceses after he had been appointed a Bishop.

Copernicus used to visit **PIENIEŻNO** – a successive town along the trail – more often. As an administrator, he was staying at Pieniężno **castle** (in ruins nowadays) while visiting the nearby villages. He definitely stayed there in October 1518 and in March 1519. Also St. Peter and Paul's church remembers Copernicus' times although the original Gothic bricks were preserved merely in the tower walls (at the end of 19th century the temple was expanded in Neo-Gothic style).

Copernicus experienced some dramatic moments in **BRANIEWO**, another city along the trail. At the beginning of January 1520, he was negotiating (on Warmian Bishop's behalf) with the great Master of the Teutonic Order. He wanted to discourage the Master from war activities in Warmia but the talks ended in failure. Copernicus and his accompanying

canon escaped the negotiations with their lives. Braniewo – the first capital of Warmia and the Bishops' residence until 1370 – still remained the largest Warmian city in Copernicus' times. Today only a single **gate tower** has remained out of the Bishops' castle; it connected the castle itself with forecastle. The prior importance of the city is reminded by a huge, Gothic **St. Catherine's basilica**.



FROMBORK – REVOLUTION IN THE SKY AND MEDICAL SERVICE

Nicolaus Copernicus spent almost 30 years in Frombork. He came here for the first time in 1501 in order to take an oath of being faithful to the statutes of the Warmian chapter (he was admitted to the chapter in 1497, however, he was studying in Bologna at that time and his canonry was accepted on his behalf by representatives). Soon he left again – this time for the purpose of studying medicine (see p. 13) and then – receiving doctor's degree in law in Ferrara. Copernicus began his real canon's life only in 1510, after leaving Lidzbark Warmiński and his uncle (see p. 18). He was almost 40 years of age then. Copernicus was immediately thrown into work. He took up a post of a chancellor, running correspondence and controlling certain offices on behalf of the chapter (he also held this function in 1520 as well as 1524–1525 and in 1529); he also became an inspector. Copernicus left Frombork for longer and moved to Olsztyn in 1516. Nonetheless, he came back to Frombork at the end of 1521 and remained there, except

St Catherine's Basilica in Braniewo,
photo D. Zaród



Southern Gate of the Cathedral Hill,
photo GEP Chroszcz



FROMBORK CANONS

Canons were living in abundance and comfort in 16 manors scattered around the fort walls in a wreath shape. At hand, they had ready servants, armour and horses. For everyday needs, some of the canons built cowsheds, grew vegetables in the garden or fattened capons. Within a small radius off Frombork lied their farms which generated income. Some canons set up ponds. Once a year, represented by a hierarchy of their perfect clerks, they collected rents from a hundred and several dozens of villages and cities on their territory within Warmia. [...]

Jerzy Sikorski, *The private life of Nicolaus Copernicus*

The canon's church duties were neither burdensome nor time consuming. Secular duties were definitely given the priority and required more time. [...] They were well-educated, they graduated from universities; in fact university-level education was a must. Most of them spoke German since they were born, like almost everyone in this region [...], however, in formal matters Latin was spoken and written.

Jack Repcheck, *Copernicus' Secret*



some short business trips, until the end of his life, that is 1543.

The canons resided on a **Cathedral Hill**, on which the predominant building is a towering, 14th century **cathedral**. It has preserved its monumental, medieval character until nowadays. A massive wall connecting the gates, the towers, the bishop's palace and internal curias (canons' houses) protected it from threats. Today, you can see an 18th century Nicolaus Copernicus' epitaph (the previous one had been removed during the erection of the Saviour's chapel) as well as a rather

contemporary, enormous tombstone of the astronomer made of black stone. The tombstone was placed at the altar of the Holy Cross (formerly the altar of St. Wenceslas), which Copernicus looked after during his lifetime and under which he was buried. Anyhow, it was not until recently that the place of Copernicus' burial has been discovered. Only in 2005 bones were discovered under the altar; after careful examination, they turned out to be Copernicus' remains.



Copernicus' monument at the foot of the Cathedral Hill in Frombork, photo GEP Chroszcz

Interior of the Frombork Cathedral, photo GEP Chroszcz



WHEN DID COPERNICUS DIE?

The question still remains unanswered. The exact date of the astronomer's death is covered in darkness. The date has not been entered into the chapter's books, however, encyclopaedias have it that Copernicus was deceased on 24 May 1543 as this is the day which Copernicus' best friend, Tiedeman Giese, mentions in his letter Tiedeman Giese. On the other hand, some other documents suggest that it was already on 21 May that a new successor canon arrived to. Copernicus had been probably a few days' dead by then as the canonry could only be granted to the successor in case of the death of the previous office-holder.

Nicolaus Copernicus' Death – painting by Aleksander Lesser, photo archives of Wikimedia Commons



Also some other buildings on the Cathedral Hill remind us of the famous canon. In the former **Bishop's palace** there is a **Nicolaus Copernicus' Museum** (phone: +48 55 2440071, www.frombork.art.pl). Accordingly to its name, the museum shows the life and work of the scholar, while presenting Frombork and Braniewo's stained glass windows and a collection of telescopes and field glasses at the same time. In the cathedral tower called **the Radziejowski Tower**, there is a Foucault pendulum – a device proving rightness of the Frombork astronomer's theory; the pendulum not only shows that the Earth orbits around the Sun but also that it revolves around its own axis. Winding stairs lead to the observation deck, from which we can admire the surrounding panorama. The tower basin houses a **planetarium** (phone: +48 55 2440083, www.frombork.art.pl), which projects views of the sky seen from any chosen point of the Earth.

Fragment of the exhibition
at the Copernicus Museum in Frombork,
photo GEP Chrosczcz





Copernicus' Tower in Frombork...,
photo GEP Chroszcz

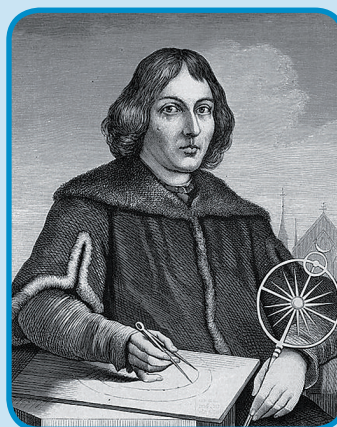
...and its cap,
photo GEP Chroszcz

The symbol of heliocentrism – the Sun encircled by the Earth – crowns the **Copernicus Tower** – the astronomer's dwelling place. Each canon was obliged to have his dwelling place within the walls and Copernicus purchased this very tower to be his own. Due to its lack of comfort, it was inexpensive. In fact, it was not adjusted to dwelling, but it was all right as a workplace. Presently, the interior of the top storey has been arranged as Copernicus' work room. However, it was not here that Copernicus observed the sky, although a famous painting by Jan Matejko entitled *Copernicus, or a conversation with God* presents it this way. In order to see the place where he astronomer observed the stars, one has to leave the Frombork fortress.

COPERNICUS THE CARTOGRAPHER

Although none of the maps drawn by Copernicus has survived until today, it is generally known that he also dealt with cartography. During his studies in Cracow, the future canon very willingly attended cosmography lectures, during which he was, among others, determining longitudes and latitudes of the Polish cities. Upon the request of his uncle Lucas Watzenrode, the Warmian bishop, Copernicus drew up a map of Warmia and the western borders of the Prussian Kingdom in Frombork in ca 1510. In 1519, while holding an administrator's post in Olsztyn, Copernicus drew up a map of south-western part of the Vistula Lagoon, which was the subject of border controversy between the Warmian Bishop and Elbląg. In 1526 Copernicus mapped out, along with the Cracow scholar Bernard Wapowski, a map of the Polish Kingdom and the Grand Duchy of Lithuania. The map comprised over 1,000 of towns, cities and villages. It is also known that in July 1529 Copernicus and a canon named Alexander Sculteti, started drawing a map of Prussia. Their work was used by Retyk (see p. 22) for drawing up his own map of the region in 1540.

Nicolaus Copernicus – lithography by Jan Feliks Piwarski, photo archives of Wikimedia Commons





Time of the great theory

What else can be more beautiful than the sky that embraces all that is beautiful [...], because of its preeminent excellence most of the philosophers have called it the Visible God.

Nicolaus Copernicus, *On the Revolutions of the Heavenly Spheres*

Canons, apart from their homes within the walls on the Hill, had their dwelling places outside the castle as well. In 1514 Copernicus purchased **St. Stanislaus' canonry** located on the western side of the fortress. The canonry was spectacular and expensive, but it had an enormous asset – it was standing at the foot of a hill with a surpassing view of the sky. In the canonry garden, Copernicus had a special plate *pavimentum* built (which he mentions in his revolutionary work), on which he could put his instruments. From there he was observing the Sun, the Moon, the planets and the stars. Then, he was doing laborious mathematical calculations in the seclusion of the canonry. He was writing his revolutionary work – as he put it – almost at the end of the world for years (see also p. 5).

The outline of Book I *On the Revolutions* was ready before Copernicus' journey to Olsztyn, which took place in 1516 (and where its final editing process took place). The canon started writing Book II after completing his administrative jobs. Finishing this part of his work is dated for 1523. Two years later Copernicus began his

Copernicus or a conversation with God
– a painting by Jan Matejko,
photo GEP Chroszcz



COPERNICUS' MODERN WORKSHOP...

... consisted of three wooden instruments. The astronomer constructed them according to the ancient formulas dating back to as far as Claudius Ptolemy (author of *The Almagest* – the famous treatise on the geocentric structure of the world). We know nowadays that these tools did not allow for high accuracy of measurements. However, they were good enough for an analytical mind to help creating a concept of a new universe.

The simplest of Copernicus' instruments was a **quadrant** – a plate with an angle scale on it, in the centre of which a peg was placed. The peg produced shadow under the influence of the sunlight or moonlight. The astronomer used the shadow to investigate spring and summer solstice; he was establishing Frombork's latitude in this was several times.

Triquetrum consisted of three mobile arms forming the shape of a triangle. One of the arms was fixed to a heavy stand. The upper arm was carrying sights and served to point to the sky; the lower rod was used to read the sighting angle, that is the altitude of heavenly bodies. The instrument served, among others, to measure the Moon altitude, which allowed Copernicus to determine that the distance of this celestial body from the Earth does not alter as much as it was assumed in Ptolemy's theory.

The most complicated instrument – **the astrolabe** – consisted of six circular, combined plates equipped with scales. Each plate represented a certain part of the celestial sphere. Using this tool, Copernicus determined ecliptical coordinates of the planets, that is their location in the sky.

Copernicus' scientific tools at the Copernicus Museum in Frombork, photo GEP Chroszcz



work on Book III. In 1530 Books IV–VI were completed as well. Copernicus work was ready but he seemed to be unwilling its publishing, for he had doubts whether his theory should be popularised. The person who finally persuaded Copernicus to publish his work was a young, talented mathematician from Wittenberg – Georg Joachim Rheticus – who came to Frombork in order to meet Copernicus in 1539. Rheticus spent 2 years with the Warmian astronomer and he was leaving Warmia with a handwritten copy of *On the Revolutions* prepared to be published. The revolutionary work was published in Nuremberg in 1543, the year when Copernicus died. Did the printed treatise manage to reach the astronomer before his death? According to the account of his friend – the Bishop of Chełmno, Tiedeman Giese – it did. The book was to reach Frombork on the day of his death. Even if it was so, paralysed and unconscious Copernicus was not aware of that after all.

The Copernicus Trail leaves the Warmia region right outside Frombork and leads through Tolkmicko to Elbląg.

THE CHAPTER'S PHYSICIAN

Due to his medical background (see p. 13), Copernicus acted in Frombork as a chapter's physician. In any case, he did not merely treat the canons but also the Warmian Bishops and secular noblemen, which resulted in travelling. In Copernicus' times the chapter was also running a **Holy Spirit hospital** for the poor (ul. Stara 3). We don't know whether Copernicus took active part in its running, however it is hard not to assume he came round to the hospital from time to time. Presently, the hospital complex houses the **History of Medicine Museum**, exhibiting, among others, some old medical and pharmaceutical tools – some of them reminding of the medicine from Copernicus' times. In the Museum you can also admire Warmian sculptures and paintings from 17th and 18th centuries. In St. Ann's chapel you can see a 15th century wall painting, and outside – two bath stoves from the same century. Next to the southern walls of the hospital there is a herb garden.

Medical utensils from Copernicus' times, photo GEP Chroszcz





OUTSIDE THE TRAIL THERE ARE PLACES WHERE COPERNICUS WAS SETTLING PEASANTS

While holding the position of the Warmian chapter's estates' administrator in Olsztyn (1516–1519 and 1520–1521), Copernicus was responsible for settling peasants near Olsztyn and Pieniężno. Settling empty fields (called the location) was one of the administrators' most onerous chores. Wars which took place in Warmia in 15th century resulted in large stretches of land being left uncultivated. What it meant for the chapter was smaller rent-based income. Empty fields were waiting for farmers who had to be somehow encouraged to settle on the chapter lands instead of somewhere else. Therefore, peasants were given certain reductions.

The administrator was obliged to make locations in person. We know which villages Copernicus visited and when from the preserved notebook entitled *Locations of abandoned lands*. He usually went on business trips with his assistant and a servant. Copernicus would assign a new farmer a team, that is live stock (horses, cows, pigs), farm tools, corn to crop and he granted 'wolnizna' privilege, which specified what time period a peasant was exempted from paying a rent.

Copernicus completed location in the following settlements: Bartąg, Brąswałd, Dywity, Gietrzwałd, Gryżliny, Gutkowo, Jaroty, Jonkowo, Kieźliny, Klebark Mały, Klebark Wielki, Kumajny, Likusy, Linowo, Lubianka, Łajsy, Łoźnik, Ługwałd, Łupstych, Mątki, Miłkowo, Myki, Nagłady, Naterki, Osetnik, Pełty, Pistki, Pluski, Porbady, Radziejewo, Redykajny, Skajboty, Słupy, Spręcowo, Stare Kawkowo, Stęki, Sząbruk, Tomaszkowo, Wołowno, Wopy, Wójtowo and Zalbki. Plans to run a thematic bike trail along these settlements are in progress.

SOURCES OF QUOTATIONS

Copernicus, N., *Commentariolus*, as *The outline of a new mechanism of the world and celestial spheres' motion* [in:] Copernicus, N., *On the Revolutions of the Heavenly Spheres*, transl. J. Baranowski, Warszawa 2009

Nicolaus Copernicus, *On the Revolutions of the Heavenly Spheres*, transl. J. Baranowski, Warszawa 2009

Copernicus, N. *The way to strike coin*, quoted after J. Drewnowski [in:] Lech Szczuski, *The philosophy and social thought of the 16th century. 700 years of the Polish thought*, Warszawa 1978

Letters of Theophylact Simocatta, transl. from Greek to Latin by Nicolaus Copernicus, transl. into Polish by J. Parandowski, Warszawa 1953

Repcheck J., *Copernicus' Secret*, transl. P. Bandel, Poznań 2008

Rybka E., Rybka P., *Copernicus. The man and the thought*, Warszawa 1972

Sikorski J., *The private life of Nicolaus Copernicus*, Olsztyn 1985

