



超级英雄园

Tomasz Rożek  
„Akademia Superbohaterów PL”  
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Fundacja Nauka. To Lubię  
ul. Jojki 7c  
44-186 Gierałtowice  
biuro@naukatolubie.pl

Tomasz Rożek with::  
Małgorzata Gogól-Górecka  
Mariusz Gogól  
Karol Kopańko  
Kamila Rajfur  
Karol Wyszyński  
Piotr Pyzik, Angelika Tes

Designed by:  
Marek Oleksicki  
Ewa Kwaśniewska

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## Introduction

Everyone knows at least one superhero. Some of them can run quickly, some of them can fly, some possess super resistant armour. What do they have in common? The fact that they permanently save the world and the people from trouble. Sometimes, we are the source of these troubles.

Superheros are not just protagonists from fairy tales. They truly exist! Some of them design airplanes, submarines, and even vehicles that can drive on other planets. Others discover new particles or explore unknown lands, including the ones that any human being has explored. They develop medicines, build bridges over chasms that make you feel dizzy only by looking at them. Some want to transmit images and sound. They live in different times, specialize in various fields, and possess multiple superpowers - but as the fairy-tale heroes, they have one thing in common: they save the world and the people.

Can you imagine the world without radio transmission, electricity, transportation, modern medicine, for example, antibiotics and vaccines? A world without geographic discoveries, bridges, roads, computers...? We could endlessly go on and on. How would such a world look?

Scientists are our superheroes who move the world forward, develop it, keep on inventing and discovering. I wrote this book so you could meet some of them. I want you to learn about them - it really pays off. Yet, I also wrote it to make you realize something important. All of them - all these Polish superheroes - made it possible thanks to their work. They were not born better, smarter, or stronger. Some of them were born in low-income families, some of them were born in difficult times. Sometimes they received no support from their community. Some of them received poor grades at school. Just like us, they faced victories and failures. Sometimes they felt overwhelmed as fulfilling their dreams required a lot of work. I hope that after reading this book, you will start believing that everyone might be a superhero. Maybe one day you will also join the Academy of Superheroes? Maybe one day somebody will write a book about you? From the bottom of my heart, I wish it to you all and myself because the world full of superheroes, both scientists and discoverers, becomes a better place.

I hope you enjoy reading this book!

Tomasz Rożek

## 前言

大家应该多少都听说过一些超级英雄。他们有的跑起来像闪电一样快，有的力大无穷，有的还会飞，或拥有坚不可摧的盔甲。而这些超级英雄们有什么共同点呢？他们都致力于拯救世界和人类免于灾难侵袭，这些灾难还经常是人类自己造成的。

然而，超级英雄可不只是故事里的人物而已，他们是真实存在的！他们之中有的制造了飞机和潜水艇，有的造出了能在其他星球上行驶的交通工具。有的发现了新的化学元素，有的探索了没人去过的未知大陆。有人研究出了新的药物，有人则在深不见底的峡谷上修筑桥梁，还有些人尝试往远方传送图像和声音。这些人来自不同时代，是不同领域的专家，各自的特殊能力都各不相同，但就像故事里的超级英雄们一样，他们有一个共同点：他们拯救世界和人类，解决各种麻烦。

你能想象没有电信技术的世界吗？如果世界上没有电、没有交通运输，也没有现代医药（比方说抗生素和疫苗）会怎么样呢？想象一下，没有地理大发现、没有桥梁、道路和电脑的世界，又会是什么样子？要一一列出的话，这些东西还有好长一串，你能想象没有这些发明和建设的世界吗？

是科学家们，也就是我们的超级英雄，推着这个世界前进。他们不断地发明和探索，促使了世界的进步。我写这本书是为了介绍他们之中的几个人，他们的故事值得你们认识，但除此之外，我还想让你们思考一些事情：这些波兰的超级英雄们，他们并不是生来就比别人厉害，没比别人聪明，更没有天生神力。他们的特殊能力全是靠自己努力得来的。他们之中有些人出身贫寒，很多人诞生于艰困的年代。有时候周遭环境并不支持他们，有些人在学校成绩也并不优秀。他们，就像我们一样，获得成功，也遭遇挫折，他们经常受限于困境，实现梦想也需要付出许多努力。我希望透过这本书让你们了解，每个人都有机会成为超级英雄。也许哪天前往超人学院的就是你们？也许将来有人会写一本关于你们的书？我非常希望你们和我都能有这么一天，因为，只要有超级英雄 - 科学家和发明家在，世界就会越来越美好。

预祝阅读愉快！



## Nicolaus Copernicus (1473 – 1543)

**Although he is best known for his astronomical observations, today, we would say that he performed them "after business hours." His duty was to administer, manage, and attend to ill patients. He was great at it. He was extremely hard working and meticulous. Above all, he was perceptive. With his critical thinking about the prevailing order in the cosmos, he created and argued the theory that "stopped the Sun and moved the Earth."**

Nicolaus Copernicus was born in 1473 in Toruń. His father, also called Nicolaus, was a merchant and a juror, i.e., a court official. His family came from a region called Silesia, from a town close to Nysa. Senior Nicolaus met his future wife, Barbara, in Kraków. She also had Silesian roots.

We do not know much about the future astronomer's childhood. Still, he probably finished school located at the parish of one of the city's churches. He probably studied with his brother Andrew, and later, which is not certain, he was tutored by his uncle - a canon from Włocławek. When young Nicolaus was only ten years old, his father died. At that time, such families would usually fall into poverty. This case was different because his mother's brother, Lukasz Watzenrode, later bishop of Warmia, took care of them. He was a significant and influential person. Thanks to his uncle, or more precisely, thanks to his money and contacts, Nicolaus continued his education and went to university. He chose to study in Cracow. But this was only the beginning of his scientific journey, which led him throughout Europe.

### Youth and Science

During this period, many knowledge-seeking Swedes, Germans, and Hungarians came to Cracow to attend the lectures delivered by Wojciech of Brudzew and many other members of the local school of astronomy and mathematics. At the famous Academy of Cracow, Nicolaus first encountered Ptolemy's theory called geocentrism. According to this theory, the Earth is fixed at the center of the Universe; whereas, the Sun and other planets revolve around it. The study of astronomy required the study of mathematics and physics. However, at that time, not all of the branches of physics that we know today existed. It was in Krakow that Nicolaus learned to construct tables and astronomical instruments. This knowledge proved to be very useful in the future.

After studying in Krakow, Nicolas went to Italy, specifically Bologna, where he studied law. He became acquainted with the works of astronomer Dominic Maria Novara, with whom he conducted observations of the Moon. After graduation, he came to Poland, but only for a while because he quickly returned to Italy to begin medical studies at the University of Padua. Copernicus was already a canon at that time. Still, contrary to the often-repeated false opinion, he never became a priest. He could perform specific duties in the church, but he was not ordained a priest.

During his apprenticeship in Rome, he conducted independent observations of the sky, including a lunar eclipse and the covering of the star Aldebaran by the Moon. He also gave open lectures in mathematics. He already thought that the generally accepted Solar System models, including Ptolemy's model (with a fixed Earth in the center), were incorrect. Soon, he returned to Poland. During his medical studies, he passed all the examinations necessary to obtain a license to practice medicine. Later, he defended his doctorate in law.

## **The Man of Renaissance**

Upon his return to Poland, Nicolaus Copernicus was responsible for a great deal of administrative work. He served as his uncle's secretary for some time, living at the bishop's court. Thanks to his medical background, he also took care of his health. The work at the bishop's side was not a bed of roses. It involved many administrative duties, frequent trips, and participation in visits of diplomatic guests. During that time, he had the opportunity to visit Prussia, participate in the coronation ceremony of Sigismund I the Old, and even worked on creating the map of Warmia and Masuria. He also finished translating from Greek into Latin the letters of the Byzantine historian and writer Symokatta, which he had begun working on while still in Italy. He dedicated them to his uncle as a token of gratitude for his help. Despite the shortage of time, he visited the well-equipped library in Lidzbark, where he deepened his knowledge and created an outline of his revolutionary theory about the place of the Earth in the universe.

He was a hard-working and meticulous young man. Therefore, his aging uncle Bishop Lucas Watzenrode saw him as his successor. Nicolaus, however, did not want to become a priest. As a result, their relations became increasingly tense. Eventually, Nicolaus decided to move out and settle in Frombork, where he took over the organizational responsibilities. He was a host of the cathedral - today, we would call him an administrator. He managed the lands that belonged to the chapter, took care of the settlement of unused lands, organized armed help for Olsztyn during the invasion of the Teutonic Knights, with whom he had negotiated earlier. He also wrote a scientific dissertation about... money. He entitled it: *On the Minting of Coin*. He noticed that counterfeit money drives the real ones out of the market. He also wrote down his thoughts on inflation, i.e., rising prices in the economy. The principles that Nicolaus Copernicus described are still present in economics today as the Copernicus-Gresham law.

In addition to his administrative, managerial, and diplomatic duties, Nicolaus practiced as a qualified physician. He attended to the members of the chapter, the successive bishops of Warmia, and the regular people, even those living far beyond the borders of Warmia. Despite so many duties, Copernicus found time to study astronomy and refine his hypothesis on the movement of planets in the Solar System. To make accurate observations, he bought a tower located within the walls of the fortress and hand-made the necessary instruments. The quadrant allowed him to measure the height of the Sun above the horizon, the triquetrum indicated the distance of the Moon from the Earth, while the armillary sphere determined the position of the Silver Globe and planets. In Frombork, Copernicus conducted the majority of his 60 recorded astronomical observations.

## **A Subversive Theory**

Copernicus was born when Poland was flourishing economically and culturally. The reign of King Sigismund I the Old was also exceptionally peaceful. It was a good time for scientists to write their works, including such a revolutionary concept as the one proclaiming that the Sun is stationary and the Earth and other planets revolve around it. It was not just a concept. Copernicus supported his ideas with mathematical calculations and observations. Of course, his work was not deprived of mistakes. In his calculations, Nicolaus assumed that the Earth and other planets revolved around the Sun in perfectly circular orbits. In reality, they orbit in ellipses. His error was corrected many years later by Johannes Kepler, a German mathematician and astronomer. Kepler had been fascinated with astronomy since childhood. As a 6-year-old, he observed the passage of a comet, and a few years later - an eclipse of the Moon. These two

phenomena made such a great impression on the boy that he decided to devote his life to astronomy. Interestingly, Kepler had very poor eyesight due to diseases suffered during his childhood. Still, it did not stop him from making observations. To this day, he is one of the greatest astronomers of all time.

Let us return to Nicolaus Copernicus. His work was a genuine revolution and shattered the established order. Nicolaus was fully aware that many people would find it controversial. For this reason, the outline of the heliocentric theory written in the work *Commentariolus*, or "Little Commentary," was intended only for trusted acquaintances. Copernicus worked on the final form of his theory for over 15 years. In addition to observing what was happening in the firmament and making calculations, he analyzed the existing works on natural philosophy, which played an essential role in shaping the groundbreaking masterpiece. Nicolaus studied nearly two hundred works of various authors - from antiquity to the Renaissance. Among the many Greek philosophers he esteemed, Aristotle held a special place. In the first chapter of his work, he collected all the theories about the solar system's structure, then "juxtaposed" them with his calculations and results of observations. The astronomer's life work, which indeed can be called the work of an entire era, was published in 1543 when Copernicus was already very seriously ill as a result of a stroke. He still had time to see it when it reached him two months after its publication. Whether he was aware of what he saw is unknown, as it happened on the last day of his life.

### **Loud Reactions**

Copernicus' theory received a thunderous reception, which is not surprising. It turned upside down everything that most famous thinkers and scientists had said about the planets and the Sun. Part of the scientific world agreed with Copernicus' concept. Among those who supported it was a professor of mathematics, George Joachim Rheticus. This scientist, who worked in Wittenberg, took lessons in astronomy from Copernicus. Both men knew and liked each other very much. They often consulted each other scientifically. It was Joachim Rheticus who encouraged Nicolaus to publish a book. Copernicus' theory, in turn, was criticized by Martin Luther, the founder of the Reformation. Anyway, the work itself opened with a preface. It was clear that the following pages of the book present only a hypothesis. However, it was not Copernicus' text.

The one written by him was removed and replaced by another, more gentle and diplomatic. Copernicus himself and the scientists who supported him feared the world's reaction to such a revolutionary concept. Among them were not only astronomers but also mathematicians and theologians. Some believed that Copernicus' work "threw" the Earth from its deserved first and most important place in the cosmos. Moreover, they claimed that his work undermined the biblical order of the world. Some of them refused to accept it. The disputes surrounding Copernicus' theory lasted several decades. In the end, its supporters lost, and opponents decided that heliocentrism (the idea that the planets revolve around the Sun) is dangerous. In 1616, Copernicus' work was placed on the index of banned books and remained there for over 200 years.

Today, Copernicus' theory, perfected by many scientists, no longer raises any doubts. Nicolaus Copernicus himself joined the group of the most eminent and, if we may say so, the most famous scientists in history.

He was able to think critically and observe the sky in a manner independent from the well-grounded schemes. I wonder where astronomy would be today if it was not for him?

## 尼古拉·哥白尼 *Mikołaj Kopernik* (1473 – 1543)

虽然他以天文观测而闻名，但今天我们会说他的天文观测是在“业余时间”完成的。行政、管理与治病是他主要的职责，并且他很擅长处理这些工作。他非常勤奋，一丝不苟。而且哥白尼很有洞察力。由于对宇宙的秩序的批判性思考他创造并论证了“停止的太阳，移动的地球”的日心说的理论。

尼古拉·哥白尼 1473 年在托伦出生。他的父亲，同名尼古拉，是商人兼陪审员，即法院书记员。哥白尼父亲的家族可以追溯到尼萨附近的一个西里西亚小村庄。他在克拉科夫认识了尼古拉的母亲芭芭拉。她也有西里西亚血统。我们对于这个未来天文学家的童年知之甚少，但很可能他毕业于该市某教区的学校。最有可能的是，他跟跟随哥哥一起读过书，后来，但不确定，由他的舅舅-弗沃茨瓦韦克培养。小尼古拉才十岁时他的父亲去世了。当时在这样的情况下家庭常常因此陷入贫困，但因为哥白尼的舅舅卢卡斯·瓦岑罗德（未来的瓦尔米亚主教）扶持他们家度过困难。哥白尼的舅舅是重要和有影响力的人。借助他的帮助，或者更准确地说是因为他的钱和人脉，尼古拉能够继续读书并上大学。尼古拉选择在克拉科夫读大学，但这仅仅是他的（遍布欧洲）科学之路的开始。

### 青年与学习

当时许多渴望知识的瑞典人、德国人和匈牙利人来到克拉科夫听阿尔伯特·布鲁楚斯基（*Wojciech z Brudzewa*）以及其他当地天文数学学院成员的讲座。在著名的克拉科夫学院，尼古拉第一次听到了托勒密的地心说理论。这是古人认为地球是宇宙的中心，而其他的星球都环绕着地球而运行的学说。

天文学的研究离不开数学和物理，虽然当时的物理学体系并不完善。在克拉科夫，哥白尼学会了如何构建数学表格以及建造天文仪器。这些知识对他日后工作很有帮助。

在完成克拉科夫大学课程之后，尼古拉前往直意大利，特别是在博洛尼亚，在当地的大学开始了法律学。就在那时，他熟悉了天文学家多米尼克·玛丽亚·诺瓦拉（*Dominik Maria Novara*）的作品，并与他一起进行了月球观测。当完成所有学业之后，他短期回到波兰，然后返回到意大利，在帕多瓦大学就读医学。哥白尼当时已经是一个法政牧师，但尽管经常重复错误的观点，他从未成为一名神父。他可以在教会中履行某些职责，但他没有被任命为神父。

在罗马实习期间，他进行了独立的天空观测，包括月食和月掩毕宿五恒星现象。他还进行了公开的数学讲座。他认为当时有效的太阳系结构模型，包括公认的托勒密的模型（以静止的地球为中心）是错误的。不久他返回了波兰。他通过了医学执业考试，然后完成了法律博士答辩。

### 文艺复兴时期

返回波兰后，尼古拉·哥白尼从事了许多行政工作。有一段时间他担任了他舅舅的私人秘书，住在主教的庄园。由于哥白尼的医学学历他关注了舅舅的身体状况。主教身边的工作并不都是舒适，有许多行政责任，要经常出差，并参与外交客人的访问。当

时他赴普鲁士公国，参加了齐格蒙特一世的加冕典礼，甚至致力于制作瓦尔米亚和马祖里亚的地图。他还完成了将拜占庭历史学家和作家 Symocatta 的希腊字母翻译成拉丁字母的工作，他还在意大利时就开始了这项工作。他将它们献给了他的叔叔，以表示对所提供帮助的感激之情。尽管时间很短，他还是参观了利兹巴克（Lidzbark）设备齐全的图书馆，在那里加深了自己的知识。在这座城市逗留期间，他完成了关于地球在宇宙中位置的革命性理论的概述。

他是一位勤奋、一丝不苟的年轻人，他年迈的舅舅卢卡斯·瓦岑罗德主教视他为继任者。不过尼古拉不想成为神父，因此他与舅舅的关系越来越紧张。最终尼古拉决定搬到弗罗姆堡定居。在那边他有很多管理工作。他担任了大教堂的主任、行政者。他同时也管理了教会的土地。管理未利用土地的安置。在条顿骑士团入侵期间，他为奥尔什丁组织了军事援助，此前他曾与他们进行过谈判。他还撰写了一篇关于…货币的科学论文《论硬币的铸造》。发现了劣币驱逐良币的现象。他还写下了他对通货膨胀的看法，即经济中物价上涨。这些原则仍然存在现代经济学中，如哥白尼-格雷沙姆定律。除了履行行政、经济和外交相关的职责外，尼古拉 - 作为一名认证医生 - 关心着教会成员、历任瓦尔米亚主教和人民，甚至在瓦尔米亚之外的人的健康。尽管他肩负重任，仍然抽出时间研究天文学，并完善他对太阳系中行星运动的假设。为了便于进行观测，他购得弗罗姆堡要塞城墙内的一座高塔。他亲自制造了必要的仪器。使用象限仪，他测量了太阳在地平线上方的高度，视差尺展示了月球与地球的距离，而浑天仪确定了月球和行星的位置。在弗罗姆堡，哥白尼进行了他记录的 60 次天文观测中的很大一部分。

## 革命性的理论

哥白尼诞生于波兰经济和文化繁荣时期。当时王位上的齐格蒙特一世的统治也异常平静，这是科学家们撰写他们作品美好的时光，包括这样一个革命性的概念，即太阳是静止的，地球和其他行星围绕太阳旋转。这不仅仅是个概念。哥白尼由数学计算和观察支撑了他的想法。这其中并非没有错误。在他的计算中尼古拉认为地球和其他行星以完美的圆形轨道围绕太阳运行。它们实际上以椭圆形循环。多年后，德国数学家和天文学家约翰内斯·开普勒纠正了哥白尼的这个错误。开普勒从小就对天文学着迷。6岁时，他看到了彗星，几年后又看到了月食。这两个现象给这个男孩留下了如此深刻的印象，他决定毕生致力于天文学。有趣的是，开普勒由于童年疾病他视力很差，但这并没有阻止他观察。直今，他依然是有史以来最伟大的天文学家之一。

我们回到尼古拉·哥白尼。他的理论是一场真正的革命，打破了既定的秩序。尼古拉意识到这会引起许多人的争议。可能出于这个原因，*Commentariolus* 简称《短论》中所写的日心说的大纲仅提供给了他最信赖的人阅看。哥白尼花了超过 15 年的时间来研究他的理论的最终形态。除了观察天空中发生的事情，自然哲学领域现有作品的分析也对塑造开创性工作起到了重要作用。尼古拉研究了从古代到文艺复兴时期作家的近 200 部作品。在他所珍视的众多希腊哲学家中，亚里士多德占有特殊的地位。在第一章他收集了所有关于太阳系构建的理论，然后与其数学计算和观测对比“碰撞”。这位天文学家的著作，当然也可以称为整个时代的著作，发表于 1543 年，当时哥白尼因脑出血病重。显然，当此著作在发布两个月后到达他手中时，他没法再次看到它。他是否意识到他所看到的我们现在无从考证，因为这件事发生在哥白尼生命的最后一天。

## 热议

哥白尼的理论受到了很大的反响，这并不奇怪。它颠覆了最著名的思想家和科学家关于行星和太阳的一切。部分科学界支持哥白尼的概念，其中包括数学教授 **Jerzy Joachim Retyk**。这位在维滕贝格工作的科学家跟哥白尼学过天文学。这两位先生很熟悉并且他们的关系也很好，经常进行科学讨论。也是 Joachim Retyk 鼓励哥白尼出版其理论。另外，宗教改革运动的马丁·路德对哥白尼的这套理论提出了批评。其实，哥白尼的著作前言也说明本作品仅仅是个假设。不过这句话不是哥白尼写的。原文被删除并被更这种更委婉地说法替代。哥白尼本人以及支持他的科学家担心世界对此革命性的理论的反应。不限于天文学家，也涉及到数学家和神学家。在某些人的看来，哥白尼的著作把地球从宇宙中当之无愧的第一、最重要的地位上“倾倒”了。此外，它破坏了世界的圣经秩序，而有些人绝对拒绝认同这个概念。对哥白尼理论的争议持续了数十年。最后，它的支持者失败了，反对者认为日心说（行星围绕太阳旋转的想法）是危险的。于 1616 年，哥白尼的著作被列入禁书索引，一禁就是 200 多年。

今天，经过许多科学家改善的哥白尼理论已经没有任何疑问，而哥白尼本人加入了历史上最杰出以及最受欢迎的科学家的行列。由于他能够批判性地思考，并在观测天空时发现了与科学家公认的结构之外的现象。如果没有他，我们今天的天文学成就会停留在哪里？



## **Maria Skłodowska-Curie (1867-1934)**

**She was outstandingly intelligent, hard-working, and modest. When she won the Nobel Prize, she didn't even buy a new hat. In the unfavorable towards women in 19th century Europe, she achieved things that many other scientists could not achieve. She became a professor at Sorbonne University, and she was awarded the Nobel Prize twice. Till the end of her life, she was a dedicated person who loved science.**

Maria was born in Warsaw. She was one of five children of the Skłodowski family. Her family was happy and supportive and valued education highly. Maria's grandfather, Józef, was a teacher and her mother, Bronisława, worked as a headmistress of a private school for girls. Her father, Władysław, studied at the Technical University in Sankt Petersburg and worked at school. Unfortunately, her childhood was not always a bed of roses. As a result of the repressions towards the Poles during the partition, her father lost his job. Just a few moments earlier, her mother fell ill. Lack of income and the illness that devoured most of the savings led to the family's financial instability. To earn some money, the family decided to sub-rent their rooms for students. However, these were not the only problems. When Maria was nine years old, her oldest sister Zofia died of typhus fever. Three years later, her mom passed away. This was a tragic loss for Maria.

When years later, already as a famous woman, Maria recalled her childhood, she said that the attraction for knowledge and interest in science was instilled in her by her father. From early childhood, Skłodowska was fascinated by his technical interests. She had above-average intelligence and an excellent memory. She learned to read very quickly and could repeat from memory a poem, which she heard only once. At the age of four, she studied her father's books, which she found in his bookcase - these included technical works and various textbooks. She also became familiar with the teaching aids that her father used to teach his classes.

### **Great Plan**

After learning at home and in a nearby school, Maria was enrolled in the Women's Gymnasium located at the heart of Warsaw. It was an excellent school and, in fact, the only educational opportunity for women at that time. At the age of 16, she graduated with the top grade. She was even honored with a gold medal. She wanted to further her education, but it was only possible abroad. Her dream was the Sorbonne in Paris. Easy to say, but how to achieve it without money?

After graduating from middle school, she spent the following year with her extended family in the countryside. She could take some well-deserved rest - at school, she often had to study several hours a day. When she was tired, she changed the subject or took a break to do some mathematical riddles. At the same time, she did not neglect her household duties. After a year's rest, she returned home and began studying at the "Flying University" with her sister. It was an underground institution educating women who could not attend universities at that time. Why such a strange name? The school did not have premises. For fear of the authorities, lecture locations were often changed, making it easier to avoid the invaders' control. The lectures at the clandestine school were for Maria only an introduction or rather a preparation for studying abroad. Money was scarce at home, and in addition, Maria's sister Bronia also dreamed of

studying in Paris. So the sisters agreed on the following plan: Bronia would be the first to go abroad. In the meantime, Maria would work in the country and send money to support her sister living in Paris. As soon as she got on her feet and found a job there, she would take Maria to Paris. Then, Bronia would support her sister.

While fulfilling these plans, Maria earned money by tutoring, but it was not a well-paid job. Therefore, she gave it up and started a more profitable job as a governess. In Warsaw, Maria worked for a family of a wealthy lawyer. Later, she taught the children of the affluent Żórawski family in the village of Szczuki, a few hours' drive from her family home. In addition to performing her daily duties, she organized teaching for the local children. She used her earnings to buy them pencils, notebooks, and pens.

Maria's employers valued her work. Yet, when she fell in love with their son Kazimierz, a student at Warsaw University, they objected to their marriage. The couple secretly met, but they knew that they could not be together because Kazimierz's family would not bless their matrimony. To avoid embarrassment, Maria decided to leave her job. However, it was not easy because the loss of income would impact Bronia's financial situation. Fortunately, as soon as her father found a better job, he took over Maria's obligation. Maria was finally able to give up her position as governess.

### **A Dream Fulfilled**

Although her sister invited her to Paris, Maria, once again, had to postpone her plans. She promised to take care of her two younger siblings. At that time, thanks to the support of her cousin Jerzy Boguski, later a professor at Warsaw University, she observed the real life of a scientist for the first time in her life. In the Museum of Industry and Agriculture laboratory, she studied chemistry and learned the basics of analytical work. It was not an easy experience. In the schools she graduated from, no one taught her this. She had no laboratory practice, did not know how to use the equipment, could not perform experiments and conduct measurements. Yet, thanks to the support of her cousin, she learned quickly. She probably had no idea how practical this knowledge would be in the future.

After about two years of work, her dreams came true - she was able to go to Paris. For the journey, she took clothes, food, a mattress, and a stool. She bought a fourth-class ticket, and after four days, she arrived at her destination. At first, she stayed with her sister, but soon she moved out and rented the cheapest possible rooms. She lived very poorly, but she preferred it to living with Bronia. To study, she needed peace. The noise and the presence of other people bothered her more than the cold in winter. She lived in rooms without heating - in winter, water left in a bowl or tea in a cup would freeze. Maria had to cover herself with clothes to survive the night. At that time, her standard meal consisted mainly of tea and barely buttered bread. Sometimes she allowed herself to buy fruit, chocolate, or meat. The difficult conditions took a toll on her health - she often fainted, and once she did it in front of her sister's friend. Under these circumstances, Bronia and her husband tried to persuade Maria to move back in with them to a heated and comfortable apartment. Maria agreed, but she only stayed with them for a week.

Despite many problems, Maria earned a bachelor's degree in physics and in mathematics. She passed a teacher's exam that qualified her to teach in women's high schools.

Maria received a scholarship that allowed her to study the magnetic properties of metals. While working in the laboratory, she met her future husband, Peter Curie. At that time, he helped her to explore the secrets of new laboratory methods. It was then that the first scientific publications co-authored by Maria were written. While looking for a topic for her doctoral thesis, she became interested in Becquerel's discoveries. Henri Becquerel was a French chemist and physicist who discovered natural radioactivity. When Maria chose her dissertation topic: Becquerel's Radiation, the issue was fresh and fractious in the sciences. No wonder that describing radiation that originates in rocks (and simultaneously penetrates opaque materials) can be intriguing. Maria chose a new direction in her career, and her scientific life began to accelerate.

### **Greatest Achievements**

At this point, Maria's experience and familiarity with laboratory work gained during her chemistry internship in Warsaw came in handy. Inspired by the study of natural radioactivity, she decided to delve deeper into this subject. Instead of the inaccurate methods of measurement used by the author, she used an instrument that her husband, Peter Curie, had developed together with his brother. An electrometer made it possible to accurately measure the activity of a preparation containing a radioactive element. Using it, she discovered a new element. By examining the samples, she knew which of the known elements were sources of radiation. She also knew the relationship between the amount of an element and the amount of radiation. Yet, something didn't add up in some of the samples. The instruments indicated that there was more radiation. Maria drew the following conclusion: a previously unknown radioactive element is present in some samples. Together with her husband, using chemical analysis, she discovered polonium. Shortly after that, she discovered another element, radium. It was a massive achievement for which, unfortunately, a very high price had to be paid.

Maria Skłodowska-Curie was the first woman to win the Nobel Prize for her research on radioactivity. Yet, she never ever buy herself a new hat from that money. Instead, she renovated the bathroom and put wallpaper in the rooms. The rest of the money she distributed among her sister and her friends. Some of it, she put on deposit.

Innovative research gave her fame and scientific standing. Her husband Peter received a new created a Department of Physics at the Sorbonne - Maria was to become an assistant professor and head of the laboratory. The couple had two daughters. Everything was going perfectly. Unfortunately, what was not yet known was that the radiation that Maria and Peter were dealing with was very harmful. Peter, who conducted many experiments on himself, often suffered from muscle pains, headaches, and general weakness. The poor working conditions in the laboratory set up in an unheated shed caused Maria to develop tuberculosis. Constant radiation exposure slowly contributed to the development of leukemia. In addition, she worked under great stress. The unexpected death of her husband, who fell under a speeding carriage while deep in thought, added to her worries. Despite the personal tragedy, Maria did not intend to slow down the pace of her research. She took over as head of the department after her tragically deceased husband. She lectured, and after another two years, she became the first woman in France to become a full professor at the Sorbonne. Unfortunately, the French Academy of Sciences refused to allow Marie to join its ranks. She was a woman, and such institutions were closed to women at the time. Two Nobel Prizes (in chemistry and physics), the title of professor, and a substantial scientific output were of no importance to the members of the Academy.

Maria built the Radium Institute in Paris, where she worked until her death. During World War I, she organized ambulances that could take X-rays on battlefields. She obtained a license to drive a truck. She got behind the wheel herself to visit field hospitals and rescue wounded soldiers. She also supported the development of Polish science, getting involved in the construction of the Warsaw Radium Institute.

Maria Skłodowska-Curie's road to success was not easy. Firstly, she suffered from family tragedies, poverty, and health problems. Later, despite excellent scientific results and honorary doctorates, the male scientific community did not trust her. Thanks to her hard work, she fulfilled her dreams of graduating from the Sorbonne, taking up a professorship. She was the first woman in history to win two Nobel Prizes. The research methods she developed are still among the basic ones in radiochemistry. She was one of the most eminent scientists in the world. Still, despite her fame, she remained a modest woman for whom family and the country she came from were of highest importance.

## 玛丽亚·斯克沃多夫斯卡-居里 Maria Skłodowska-Curie (1867-1934)

她非常聪明、勤奋和谦虚。她甚至没有用诺贝尔奖金买一顶新帽子。即使在对女性不利的 19 世纪的欧洲，她也取得了许多其他科学家做不到的成就。她成为索邦大学的正教授和双诺贝尔奖获得者。直到她生命的尽头，她都是一个敬业和热爱科学的人。

玛丽亚出生于华沙。她是家中五个孩子中年纪最小的。她在一个十分重视教育的温馨幸福的家庭度过了童年。玛丽亚的祖父约瑟夫是一位受人尊敬的教师，她的母亲布朗斯拉娃是一所私立女子学校的校长。他的父亲瓦迪斯瓦夫他在圣彼得堡理工学院学习并在学校工作。可惜玛丽亚的童年并非一帆风顺。由于波兰人在分区期间受到排挤，玛丽亚的父亲失业了。父亲失业之前玛丽亚的母亲患病。随着失去收入来源以及昂贵的医药费用，家庭的经济状况恶化。为了挣钱，斯克沃多夫斯卡家开始出租房间，尤其是给大学生租。不幸的是，这并不是问题的结束。玛丽亚 9 岁时，她的大姐索菲亚被传染斑疹后死亡。三年之后她的母亲也去世了。失去了两位亲人对玛丽亚打击很大。

多年后，身为名人的玛丽亚回忆起自己的童年，她说父亲给她灌输了对知识的吸引力和对科学的兴趣。斯克沃多夫斯卡从小就对父亲的技术着迷。她的智力超出了平均水平，她也有出色的记忆力。她很快学会了阅读，她可以凭记忆复述她只听过一遍的诗歌。四岁时她已经开始研究她父亲书柜里所发现的书籍，即科学的作品和不同的课本。她还熟悉了她父亲用来上课的教具。

### 伟大的计划

在家中和附近的寄宿学校学习一段时间后，玛丽亚转到一所位于克拉科夫郊区街的女子文理学校。这是一所很好的学校，基本上是当时女性最后一次获得学习的机会。16 岁时她从那里毕业，毕业时获得一枚金质奖章。她想继续读书，但只能在国外实现。她的梦想是在巴黎索邦大学读书。说起来简单，但没钱如何实现这个梦想？

高中毕业后的第二年，她跟亲戚们待在乡下。在那里她可以休息，这是她应得的，因为在学校，她常常一天要学习甚至十几个小时。累了她就改变一下学科或者玩数学谜题。同时她没有忽略家务。次年返回了华沙，并与她姐姐一起就读于移动大学。这是一所仅招女学生的波兰秘密高等教育爱国机构。大学的名称为什么这么奇怪？因为学校没有固定的场所。由于害怕当局，经常改变讲座场地，这更容易避开分区者的控制。对玛丽亚来说，秘密学校的讲座只是介绍，更确切地说是出国留学的准备。家里缺钱，并且玛丽亚的姐姐布洛尼亚也想在国外读书。姐妹俩策划了计划：首先是布洛尼亚出国，玛丽亚在国内工作并给她寄钱，使她能够在巴黎养活自己。在巴黎找到工作之后就会请玛丽亚来到巴黎。后来是布洛尼亚要给妹妹提供经济援助。

为了实现这个计划，玛丽亚通过开辅导课赚钱，但因为挣钱不多，她又去改当家庭教师。首先在华沙在一位律师的家，后来在地主亲戚奥劳斯基家，离家几个小时的车程。除了履行日常职责外，她也为当地儿童组织教育。她花了自己的钱给孩子买了本子和铅笔。在那边玛丽亚爱上了雇主的儿子卡齐米日-华沙大学的学生，男孩的父母重视玛丽亚，但反对了他们的婚姻。他们还会时常见面，但他们知道卡齐米日的家不同意他们俩结婚。在这同样的情况下，辞职是最好的选择。这并不容易，因为收入损失会导

致布洛尼亚财务困难。幸亏，玛利亚的父亲获得了高薪职位之后给了玛丽亚帮助。这样她就能直辞去家庭教师的工作。

## 梦想成真

虽然姐姐邀请玛利亚到巴黎，她需要推迟自己的计划。她承诺了要照顾两个弟弟妹妹。当时，借助于她堂兄约瑟夫·博古斯基，未来的华沙大学教授的帮助，玛利亚才第一次体验了科学家的真实生活。在位于工农业博物馆的实验室里，她学习化学，并学会了分析工作的基础。这并不是一次轻松的经历。在她所上的学校里没人教她如何操作。她没有实验室的经验，不会用仪器，不会进行实验，也不会做测量，但在她亲戚的帮助下很快就掌握了一切。她没想到她当时所获得的知识对她未来的工作有多大用处。

约两年之后她实现了自己的梦想 - 前往巴黎。路上，除了衣服和食品，她还带来自己的床垫和凳子。她买了四等舱的票，四天后到达了巴黎。最初她跟姐姐一起住，后来自己租了最便宜的房间。她的生活条件很朴素，但最大的优势是平静，使她能够安心的学习。与冬天的霜冻相比，她更受噪音和其他人在场的困扰。她住在没有暖气的房间- 冬天水盆里的水和水杯里的茶水都冻了。为了过一夜她必须盖上很多衣服。当时她的标准餐主要是茶水和几乎不涂黄油的面包。有时她允许自己买水果、巧克力或肉。困难的条件影响了她的健康——她经常晕倒，她姐姐的一个朋友曾经目睹过这种晕倒。在这样的情况下布洛尼亚与她丈夫想说服玛利亚跟他们一起住在有暖气，舒适的房子里。玛利亚同意了，但在姐姐家仅仅住了一周。

尽管有很多困难，玛丽亚还是以优异的成绩获得了物理学和数学学士学位，并通过了教师资格考试，可以在女子中学讲课。她获得了研究金属磁性的奖学金。在实验室工作期间认识了未来的丈夫 - 皮埃尔·居里(Pierre Curie)，当时他正在帮助她探索新的实验方法。就在那时，由玛丽亚参与合著的第一批科学出版物出版了。寻找博士论文主题时，她对贝克勒尔的发现产生了兴趣。亨利·贝克勒尔(Henri Becquerel)是发现天然放射性的法国的化学家和物理学家。玛丽选择其博士论文的话题《贝克勒尔的放射性》时这是科学中新鲜有趣的概念。描述岩石发出的辐射（同时穿透不透明材料）可能很有趣。正是在选择这条职业道路后，玛丽亚的科研生活开始加速。

## 最大的成就

玛利亚曾经在华沙的化学实验工作的经验派上了用场。受到天然放射性研究的启发，她决定探索这个话题。她没有使用原作者使用的不准确的测量方法，而是使用了她的丈夫皮埃尔·居里与他的兄弟开发的仪器。该仪器叫验电器，用来准确测量含有放射性元素的制剂的活性。运用验电器，她发现了新的元素。进行实验时她知道哪些已知元素是辐射源。她还知道元素量与辐射量之间的关系。但有些样品出了问题。仪器显示有更多的辐射。玛丽亚由此得出结论：一些样品含有一种以前未知的放射性元素。她与丈夫一起使用化学分析发现了钋。不久之后，她发现了另一种元素，镭。这是一项巨大的成就，不幸的是，必须为此付出非常高的代价。

她是第一位因研究放射性现象而获得诺贝尔奖的女性。她甚至没有用奖金买一顶新帽子。她装修了卫生间，在房间里贴了墙纸。剩下的钱借给了她姐姐，援助了她的朋友，一部分存在银行里。创新研究赋予了她名气和科学地位。为她的丈夫皮埃尔在索邦大

学成立了物理系，玛丽亚将在那里成为助理教授和实验室负责人。他们夫妻俩有两个女儿。一切都很顺利。不幸的是——当时并不为人所知——玛丽亚和皮埃尔所研究的辐射非常有害。亲自进行许多实验的皮埃尔，经常遭受肌肉酸痛、头痛和全身无力的困扰。由于实验室工作条件恶劣，该实验室位于一个没有暖气的棚子里，玛丽亚开始患上肺结核。持续暴露在辐射中缓慢地促进了白血病的发展。此外，她工作压力很大。她丈夫因忙着思考被一辆马车撞死使玛丽亚悲痛万分。玛丽亚研究的速度没有放缓。玛丽亚接受了她丈夫在巴黎大学物理系的职位。开讲座，两年之后成为索邦大学首位女教授，但法国科学学院没有同意玛丽亚的加入。毕竟她是女性，而在那个时代类似的机构没有为女人开放。两个诺贝尔奖、教授学位以及巨大的科学成就对科学学院的成员来说并不重要。

玛丽亚在巴黎建成了镭研究所，在那里她一直工作到去世。在第一次世界大战期间她安排了在战地做 X 光的救护车。她考了卡车驾照，自己开车考察了野战医院，拯救受伤的士兵。此外，她也支持了波兰科学的发展，参与了华沙镭研究所的建设。

玛丽亚·斯克沃多夫斯卡-居里的成功之路并不容易。首先遇到家庭悲剧，贫困与健康问题。然而，尽管她优秀的科学成就与荣誉博士学位，她遭到男性科学界的不信任。由于她的勤奋，她实现了从索邦大学毕业的梦想，并在那里获得了教授职位。她是首位被授予两次诺贝尔奖的女性。由她创立的研究方法迄今为止是放射化学的基础。她是世界上最优秀的科学之一，但尽管她声名鹊起，但她仍然是一个谦虚的女人。她的家庭和祖国对她很重要很亲切。



## **Michał Boym (1612 - 1659)**

**He earned the nickname of Polish Marco Polo, but this is definitely an unfavorable comparison. Unfavorable for Michał Boym. He was a Jesuit priest, traveler, cartographer, naturalist, and one of the first European orientalists. He gained such trust from the Chinese emperor that he sent him as his envoy and ambassador to the Vatican.**

Michał Boym came from a very respectable family. His grandfather was probably the secretary to King Stefan Batory, and his father served as the court physician to Sigismund III Vasa. When Michał was 14 years old, he fell seriously ill and promised God that if he recovered, he would enter a monastery. When he regained health, he joined the Jesuit order. He completed his studies in theology and philosophy. After being ordained a priest, he managed to get permission from the Pope to go on a mission trip to China. It was not so easy. The young priest had to apply for approval for a long time - it was rejected nine times. However, with his persistence, he convinced his superiors, and in 1641 he set off on his journey. He sailed from Lisbon, circumnavigated Africa (the Suez Canal was constructed several hundred years later), and stopped in Mozambique, which was a Portuguese colony. In those days, the Portuguese dominated the great waters, and they had exclusive rights to trade with China. In 1641, three years after sailing from Europe, Michael arrived in Macau. Today it is part of China, but then a city that was an important and autonomous trade center.

### **Nature and Geography**

In Macau, Michał Boym began working in a school. He had to learn the language and learn the customs of the place where he was to live. Later he was sent to work on the island of Hainan in southern China. There he discovered a true passion for learning about China, a completely unknown country in Europe. He became passionate about observing and describing nature. He found an urge to explore already during his trip to China. For example, he saw hippos in the countries he visited, which he called sea horses. While on the island of Hainan, he described the Chinese flora and depicted it in his drawings. He spent a lot of time exploring the secrets of Chinese medicine. He presented the properties of ginseng, a root that restored strength and vitality. He told the world about lychee for the first time. He described fruits already known but still unexamined, such as mangoes, bananas, and pepper seeds. In his book, Boym tried to explain the taste and smell of pineapple, papaya, cinnamon, and ginger. The articles he published became the first complete descriptions of Chinese nature in Europe. At that time, China was an unknown world of wonders for many Europeans as they knew almost nothing about it. Travelers who came back from China did not bring knowledge about the country itself, and their pieces of information were often contradictory. Different names were assigned to the same settlements. At the initial stage of trade cooperation, in-depth knowledge of customs, plant vegetation, animals of such a distant part of the world was not needed. It was not even known whether the country which Marco Polo reached from the land side (and which he called Cathay) was the same country which the Portuguese had reached by sea. Michał Boym put this knowledge in order by creating the first atlas of China. It consisted of 18 hand-painted sheets on which mountains, rivers, and the most important cities of China were marked, not only those on the coast. He also carefully marked the Korean Peninsula on his maps even though the

previous European travelers held Korea to be an island. He also marked the location of the Gobi Desert and even the Great Wall of China. Everything was accompanied by illustrations of plants, animals, and scenes of the everyday life of the inhabitants.

### **A dangerous mission**

Unfortunately, just a few years after Michał began his work in China, there was a Manchurian invasion of the island of Hainan, where Boym was staying. China had been in the throes of civil war for years, and the Manchus had seized their opportunity - the Chinese emperor Yongli had to flee the capital. A vast crisis hung over the dynasty, which had been in power for 300 years. The emperor came up with an idea to ask for help from European countries, including the Vatican. The head of the envoy to Europe was Michał Boym. The mission was hazardous and delicate. The European courts were at odds with each other, and the Portuguese did not care at all about keeping the Yongli emperor in power because they were already making deals with the Manchus behind his back. Boym agreed to move to Europe. He encountered the first great difficulties in India. He was arrested there by the Portuguese viceroy. The Portuguese feared that Boym would eventually succeed in convincing the European courts to help the Chinese. Fortunately, Michał managed to escape. He couldn't board a ship, or he would fall into Portuguese hands again, so he set off for Europe by land.... on foot. This way, he walked over six thousand kilometers. After reaching the Black Sea, he boarded a ship. When he sailed into Venice in 1652, he thought things could not get worse. However, diplomacy proved to be a complicated task.

Venice tried to remain neutral in the conflicts, so the high lord did not want to grant an audience to the envoy. After some time, Michał gained the favor of the French ambassador. However, that deprived him of the opportunity to meet with the Pope, who supported the parties opposing France. Finally, Boym managed to meet with the Pope, but it was already a new head of the Catholic Church. He waited for the meeting for three years. Instead of the desired military help, he received a letter from the emperor with words of encouragement and support. However, the Pope interceded with the Portuguese king John IV, who granted military help.

Michał Boym set out on his return journey in 1656 and, as before, got stuck in India. The Portuguese still wanted to stop him on his way, but also managed to escape again. He died in 1659 in Kuangsi province, exhausted from his journey to the imperial court.

He was already very close to his destination. Unfortunately, he would not have been able to help the emperor, who was finally defeated.

It was not until after Michał Boym's death that most of his works appeared in print, including a translation of the *Canon of the Yellow Emperor*, the oldest Chinese medical book. Other manuscripts were never published.

## 卜弥格（卜弥格）Michał Boym (1612 – 1659)

他获得了波兰的马可·波罗的绰号，但这绝对是一个不合适的比较，对卜弥格而言。他是耶稣学会士、旅行者、制图师和博物学家，最早的欧洲东方学家之一。他赢得了中国皇帝的信任，于是派他出任特使和大使前往……梵蒂冈。

卜弥格出身于一个非常受人尊敬的家庭，他的祖父可能是斯特凡·巴托里国王的秘书，他的父亲是齐格蒙特三世瓦萨的宫廷医生。14岁时弥额尔患重病，当时他向上帝承诺如果病好了他将会进入修道院。他的病好了之后他加入了耶稣会修道院。完成了他的神学和哲学研究，被任命为神父后，他设法获得了教皇的许可前往中国进行传教。这并不容易。年轻的神父花了很长时间获得批准，他的审批被拒绝了九次。他的固执最终说服了他的上司，并于1641年启程。他从里斯本出发，绕道非洲（苏伊士运河在数百年后开通），然后停留在当时归归属葡萄牙的莫桑比克。此时葡萄牙是海上强国，与中国有专属贸易权。从欧洲出发三年之后于1644年弥额尔终于到达了澳门。如今澳门是中国的一部分，但在当时是一个重要，自治的贸易中心。

### >>自然与地理

在澳门，卜弥格开始在学校工作。他需要学语言，熟悉当地的习俗。后来被派到位于中国南部的海南岛。在那里，他发现了对探索中国这个在欧洲完全不为人知的国家的真正激情。他以惊人的热情开始了对自然的观察和描述。例如，在他访问的国家中，他第一次看到了河马，他称之为海马。在海南岛居住时他描述，并以图画的形式呈现出来了中国的植物。他花了很多时间探索中医的奥秘。是他描述了恢复力量和活力的人参的特性。他发表的研究成果成为欧洲第一个对中国自然的完整描述。他初次给世界介绍荔枝。他描绘了当时的人已知道的，但未研究过的水果，如芒果和香蕉以及胡椒籽。在他的书中，博伊姆试图描述菠萝、木瓜、肉桂和生姜的味道和气味。对于当时的欧洲人来说，他的书似乎描述了一个仙境，就像在描述另一个世界。当时，欧洲对中国几乎一无所知。从中国返回的旅行者没有分享关于中国的情况，并且常常提供了相互矛盾的信息，对同样的村镇起了不同的名称。在贸易关系发展初步的阶段不需要深入了解如此遥远的地方的风俗、植物或动物。甚至不知道马可·波罗从大陆到达的国家（他称之为契丹）与葡萄牙人通过海上到达的国家是否是同一个国家。卜弥格撰写《中国地图册》整理了早期关于中国的信息。在这部地图集总共18幅标记了中国山、河及最重要的城市的位置，不限于海边的城市。尽管在欧洲旅行者的地图上韩国是一个岛屿在他的地图上准确地标出了朝鲜半岛。他还标出了戈壁沙漠乃至中国长城的位置。绘画了植物、动物和居民日常生活场景的插图。

### 危险的使命

弥额尔在中国开始传教的工作随后几年，满族人侵略了博伊姆所居住的海南岛。中国多年来一直被内战吞噬，满洲人利用了他们的机会 - 永历皇帝必须逃离首都。由于统治300年的朝代陷入了巨大的危机，因此皇帝决定请求欧洲及梵蒂冈的帮助。卜弥格成为派遣欧洲的使团的团长。他的任务很危险也很敏感。欧洲宫廷之间有纠纷，并

且葡萄牙人不支持永历皇帝政权，因为他们已经私下里与满清进行洽谈。博伊姆同意前往欧洲。到印度之后就遇到了困难，被葡萄牙总督逮捕。葡萄牙人担心博伊姆会说服欧洲国家援助中国。弥额尔设法逃，但无法坐船回国，否则又会被葡萄牙抓住，所以他通过陆路前往欧洲……步行。就这样，他走了六千多公里。到达黑海上船。于1652年到达威尼斯之后他以为克服了最大的困难，不过他发现了外交却是一项更加艰巨的任务。

威尼斯试图在冲突中保持中立，因此总督不想接受使团请见。一段时间后，弥额尔得到了法国大使的青睐，但他与失去了与教皇交谈的机会，因他支持了法国的反对派。博伊姆终于会见了教皇，不过是下任期的教皇。他等了三年，但没收到他所渴望的武力援助，只是拿到国王撰写一封表示鼓励和支持的信。为此，教皇向葡萄牙国王约翰四世求情，后者承诺提供具体的军事援助。

1656年卜弥格启程返回中国，并和以前一样，被困在印度。葡萄牙人依然想阻止他，但他再次也逃脱了。**八年之后到达中国**。于1659年在回中国的途中因为劳累和疾病，在广西省病死了。

虽然接近了他的目标了，但是他无法援助中国皇帝。两年后明朝被击败了。

卜弥格去世之后大部分他撰写的作品才得到出版，包括《黄帝内经》最早的传统中华医学著作的译文。其他手稿从未出版。



**Paul Edmund Strzelecki**  
(1797 - 1873)

**He was the first Pole to circumnavigate the globe alone. The discoverer of Australian gold and author of the first thoroughly scientific study describing Australia. British Queen Victoria made him a Knight of the Order of St. Michael and St. George for this book, and Oxford University awarded him an honorary doctorate. When famine broke out in Ireland in the mid-19th century, Strzelecki saved many children from starvation with his innovative ideas.**

## **Europe and America**

Born near Poznań, he studied first in Warsaw and then in Kraków. Unhappily in love, he decided to go abroad. First, he visited Switzerland, then Italy, France, and England. At the age of 37, he set off from Liverpool on a scientific journey around the world. He was the first Pole to do so. As he set his foot in New York, he began a year-long scientific expedition around North America. He conducted meteorological, geological, and geographical research. He was interested in the methods of growing crops and even the customs and culture of the Native Americans. It was he who discovered the deposits of metal ores, which are still exploited in Canada today. From North America, he got to Brazil via Mexico and Cuba. Then there was Argentina, Chile, Uruguay, Peru, Ecuador, and El Salvador. He explored volcanoes, mountain ranges, and searched for natural deposits, often with positive results. On his way to Australia, he visited many previously unexplored islands. For example, he visited the island of Kealakekua, where only 60 years earlier, the famous British sailor and astronomer James Cook had been killed. Strzelecki wrote the first scientific descriptions of many Hawaiian islands, their volcanoes, mineral deposits, and wildlife. The same was true of many islands in Oceania. On the North Island of New Zealand, Strzelecki conducted the first-ever geological research. On the South Island, he described and identified deposits of lead, iron, and copper. These deposits provided money for the country for years. However, he gained his greatest fame by exploring Australia.

## **Australia**

He arrived at Botany Bay, or Botany Bay, on which Sydney lies, then he was 42 years old. He was surprised to find the city so peaceful and friendly as he had heard it was the most demoralized colony globally. Australia was a penal colony. Strzelecki conducted the first geological surveys in the vast area of Australia. It was he who gave the highest peak of the Great Dividing Mountains the name of Mount Kosciuszko. He discovered coal, oil, and metal ore deposits in many places. He corrected the geographical position of islands on maps, plotted rivers, mapped mountains, and drew accurate maps of coasts.

The conclusion of his many years of research was the creation of a geologic map. The map was very accurate as it was created on a large scale. When expanded, it was 7 meters long. However, the most interesting part of Strzelecki's Australian adventure was his discovery of gold deposits in New South Wales. The governor of Australia asked the scientist to keep the discovery a secret because he feared riots and violence. Most whites on the continent had a criminal past. The governor argued that going to Australia was a punishment, and if it came out that gold had been discovered there, it would be treated as a reward. Strzelecki obeyed and did not describe the gold deposits he had discovered. It was a wrong choice. He lost a lot of money, and the discovery of gold would have been a ticket to the world's scientific elite for him as a geologist. Several years later, the deposits discovered by Strzelecki were "discovered" by Edward Hargraves, who made a fortune. By the way, if Strzelecki had announced the discovery of gold in Australia, he could have changed the history of Antipodes and America. His discovery took place in 1839. In California, on the other hand, gold was discovered

almost ten years later. When crowds of entrepreneurial and industrious people from all over the world (and technology and commerce) were heading to California, no one knew about Australian gold yet, because Strzelecki was keeping his promise to the governor.

From Sydney, Strzelecki sailed through the Philippines, Indonesia, and Hong Kong until he reached China. Then there was Singapore, India, Egypt, Algeria under French occupation, France, and England.

## Help

Upon his return to London, Strzelecki published a scientific monograph on Australia's eastern and southern parts. That was the first scientific study of the continent. The book brought him great fame and, for almost 50 years, was the primary work focusing on Australia. The book was 500 pages long. Charles Darwin wrote to Strzelecki after reading it

>> "I wish with all my heart that at least a fourth part of our English authors could think and write in language at least half so vivid, and yet so simple." <<

This book was a real revolution. Strzelecki received an honorary doctorate from Oxford University. Queen Victoria made him a Knight of the Order of St. Michael and St. George.

When famine struck Ireland in 1846, Strzelecki was in charge of the relief organization. He presented visionary ideas, such as feeding hungry children at school, distributing clothes to children rather than their parents, and educating them about hygiene. At its peak, there were approximately 200,000 children under the care of the organization that Strzelecki led.

In his will, Strzelecki requested that all of his correspondence and unpublished notes be burned after his death. The executor of the will fulfilled this wish. As a result, many descriptions of cultures and customs of peoples from all over the world disappeared forever.

He visited six continents and crossed the equator six times. His name was used in naming several species of animals and a mountain range, a desert, a nature reserve and a river in Australia, and two mountains on the islands of Oceania. In his diaries, he described the hard life of the Native People of North and South America. He could not come to terms with the slave trade he witnessed in Brazil. Strzelecki abhorred violence and was known for not using firearms in discussions with the natives, which was unusual behavior among white explorers. In Australia, to the surprise of the British, he drew attention to the mistreatment of Aborigines. What may seem incredible today, in his letters and diaries, he wrote about the need to protect nature in Australia, pointing out, among other things, the harmfulness of logging.

**帕维尔·艾德蒙·斯特爵雷茨基** Paweł Edmund Strzelecki  
(1797 – 1873)

他是第一位独自环游世界的波兰人。澳大利亚黄金的发现者及首次发表有关澳大利亚的综合科学研究报告的作者。为此著作英国维多利亚女王授予他圣米迦勒及圣乔治勋章的称号，牛津大学授予他荣誉博士学位。当 19 世纪中叶爱尔兰爆发饥荒时斯特爵雷茨基拯救了许多孩子们免于饥饿。

### >>> 欧洲与美洲

他出生在波兹南附近，但他首先在华沙学习，然后在克拉科夫学习。失恋之后决定出国。首先到达瑞士，然后前往直利、法国和英国。37 岁那年，斯特爵雷茨基从利物浦出发，为科学研究而开始了环球旅行。他是第一个这样做的波兰人。在纽约上岸后开始了为期一年半的北美科学考察。他从事气象、地质和地理研究。他对种植植物的方式感兴趣，甚至对印第安人的习俗和文化感兴趣。是他发现了加拿大开采至今的金属矿床。他从北美经墨西哥和古巴到巴西。然后去阿根廷、智利、乌拉圭、秘鲁、厄瓜多尔和萨尔瓦多考察。他对火山、山脉进行研究，并寻找了天然矿藏，通常都取得了积极的成果。在前往澳大利亚的途中，他参观了许多以前未探索过的岛屿。例如，他参观了 60 年前英国著名水手和天文学家詹姆斯库克去世的凯阿拉凯夸岛。许多夏威夷岛屿的第一个科学描述，包括对火山、矿藏以及自然的描述，都是由斯特爵雷茨基编写的。大洋洲的许多岛屿与此类似。在新西兰北岛，他进行了历史上第一次地质调查。在南岛，他描述并标记了铅、铁和铜矿床。这些金属矿床是新西兰多年的资金来源。通过研究澳大利亚斯特爵雷茨基声名鹊起。

### >>> 澳大利亚

他 42 岁时来到了植物湾，也就是悉尼的植物湾。因之前听说这是世界上人文环境最差的殖民地他感到很惊讶发现这座城市和平友好。澳大利亚以前是个流放地。在澳大利亚广大的地区上进行了第一次地质调查。是他将大分水岭的最高峰命名为科修斯科山。他在许多地方发现了煤、石油和各种金属矿床。他修正了地图上岛屿的地理位置，绘制了河流、山脉，并绘制了准确的海岸地图。一张地质图总结了他多年的工作。该地图很详细，并其比例很大，有 7 米长。然而，斯特爵雷茨基在澳大利亚探险中最有趣的事情是在新南威尔士州发现的金矿。澳大利亚州长请求科学家对此发现保密，因为他害怕骚乱和暴力。澳大利亚大陆上的大多数白人都有犯罪历史。州长辩称，去澳大利亚是一种惩罚，如果发现在那里有黄金，那就变成奖励。斯特爵雷茨基接受了州长的请求，并没有描述他发现的金矿床。这样的行为没有道理。他亏了很多钱，而黄金的发现是地质学家界科学精英的通行证。十几年后由斯特爵雷茨基发现的金矿床被爱德华·哈格雷夫斯再次“发现”，并发了财。考虑到这一点，若斯特爵雷茨基宣布在澳大利亚发现黄金的信息，他不仅可以改变安蒂德波斯群岛的历史，还可以改变美国的历史。他的发现发生在 1839 年。美国加利福尼亚州大约 10 年后才发现了黄金。当来自世界各地（以及技术和商业）的淘金者前往加利福尼亚时，没有人知道澳大利亚也有黄金，因为保罗信守了对州长的诺言。

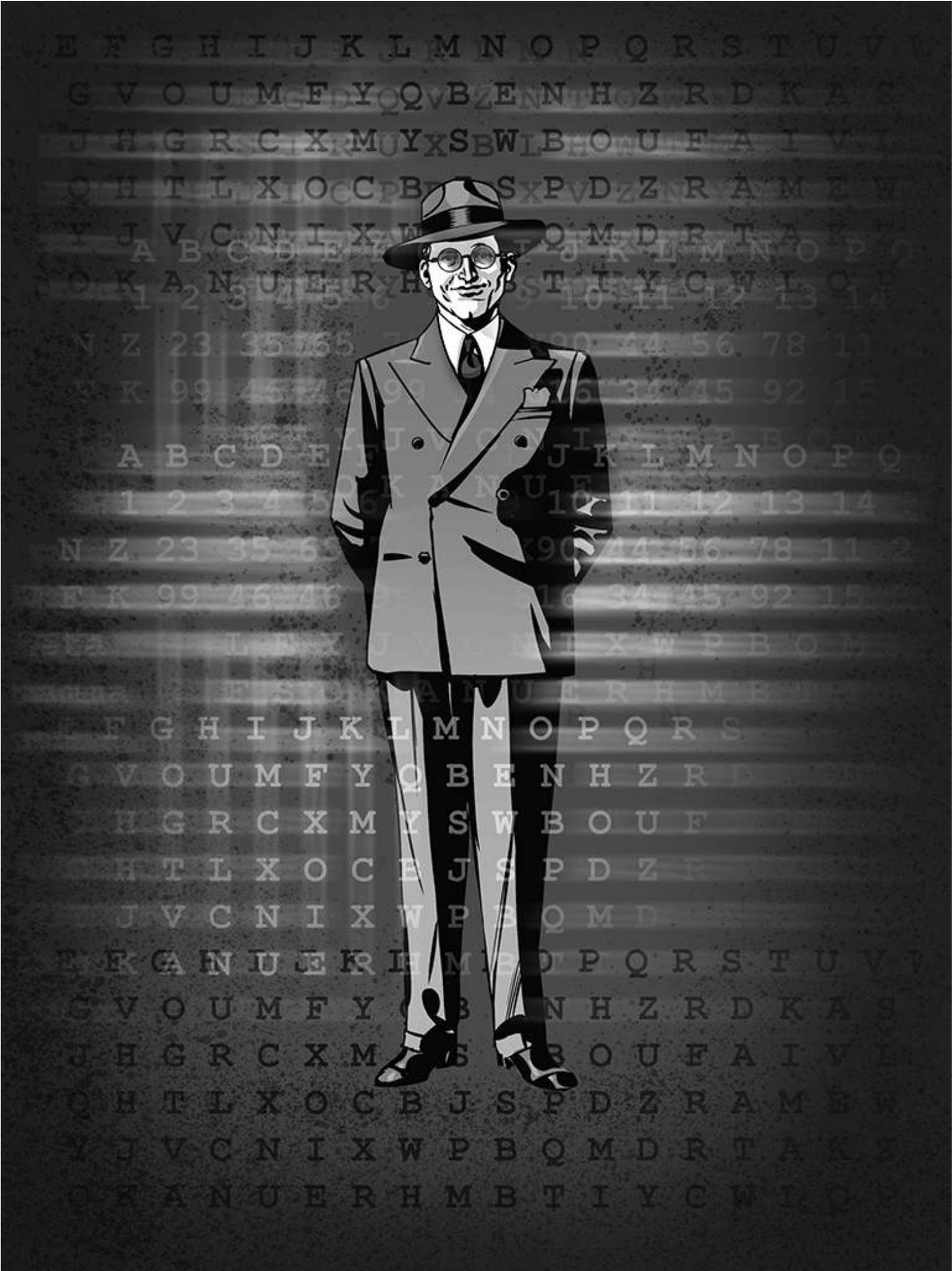
从悉尼出发，斯特爵雷茨基航行经过菲律宾、印尼和香港，直到到达中国。然后去新加坡、印度、埃及、法国占领下的阿尔及利亚、法国，最后到了英国。

## >>援助

返回伦敦之后，斯特爵雷茨基出版了一本关于澳大利亚东部和南部的科学专著。该专著是第一项有关澳大利亚的科学研究报告，使他出名，并在近 50 年以来一直是介绍澳大利亚的主要著作。这本书有 500 页。查尔斯·达尔文看完这本书之后给斯特爵雷茨基写信“我衷心希望如果有四分之一的我们英语作家在思路和写作上能用到您一半灵活的并如此简单的语言表达就好了。”它真是一本革命性的作品。为此著作，牛津大学授予斯特爵雷茨基荣誉博士学位，英国维多利亚女王授予他圣米迦勒及圣乔治勋章的称号。

1846 年爱尔兰爆发饥荒时，斯特爵雷茨基被委托管理提供帮助的组织。他的远见的想法令人惊讶，例如他提出了在学校喂养饥饿的孩子的想法，衣服交给孩子，不给家长，而且提供卫生教育。在高峰时段由斯特爵雷茨基管理的组织照顾了约 20 万名儿童。在遗嘱中，他要求在他死亡后烧毁他的所有信件和所有未发表的笔记。遗嘱的执行人实现了这个愿望，使许多观察，包括对世界各地人民的文化和习俗的描述，永远消失了。

他走遍了 6 个大洲,6 次穿越赤道。他的名字不仅被用来命名几种动物，还用来命名澳大利亚的山脉、沙漠、自然保护区和河流，以及大洋洲岛屿上的两座山。他在日记中描述了北美和南美印第安人的辛苦的生活。他无法接受他在巴西目睹的奴隶贸易。他憎恶暴力，并以与当地讨论时不使用枪支而闻名,因为这样的行为在探险者的当中并不常见。在澳大利亚时斯特爵雷茨基令英国人惊讶的是他提请注意对土著人的虐待。在今日的看来令人惊奇的是，在他的信件和日记中，他提出了保护澳大利亚自然的必要性，并指出了伐木的危害。



## **Marian Rejewski (1905 - 1980)**

**He was a brilliant mathematician. Although he did not use a weapon, he saved millions of people during the war. Thanks to his work, World War II lasted a few years shorter. He certainly could have been a hero had it not been for the fact that... his occupation was secret! It also didn't help that others took credit for his work.**

Between World War I and World War II, Polish intelligence had a lot of work to do. Germany, breaking the Treaty of Versailles, secretly expanded its army. The number of German orders and reports grew exponentially. At the same time, Germans started to encode them in a new, previously unknown way. Modern cryptology was based on advanced mathematics: calculus of probability and operations on permutations. A team of talented mathematicians was needed to find out what was going on behind the western border.

### **The Impossible Does Not Exist**

In 1929, the General Staff of the Polish Army officers admitted over twenty students of the Institute of Mathematics of the Poznań University to a secret military cryptology course. Why exactly from this particular university? The students coming from Prussian partitioned Poland knew the German language, as they had to learn it at school. The ability to speak was crucial. Marian Rejewski, Jerzy Różycki, and Henryk Zygalski stood out among the students. Rejewski, born in 1905 in Bydgoszcz, was a senior student. All three excelled in passing the tests while fulfilling their duties at the university. After graduation, Rejewski started working at the Cipher Bureau of the General Staff of the Polish Army. Everyone treated him and his colleagues as ordinary university employees. Little they knew that they went to the basement of the City Headquarters to the so-called "black office," where they could work on ciphers at any time of day or night.

This unit ceased its activity two years later, and the most talented ones, including Marian, were sent to work in the Warsaw Cipher Bureau. Here they had to face their greatest adversary. The Enigma (Greek: riddle) was manufactured for the civilian market to encrypt business correspondence. However, it was quickly adapted and improved by the German army. There were many of these machines. If all of them used the same settings, each one could decode a message from another. An operator who wanted to encrypt a message would press the keys with the appropriate letters one by one. Through a combination of electrical wiring and mechanical rotors, the letters replacing the original ones were illuminated. At first glance, the cipher looked utterly random and breaking it seemed impossible to Western intelligence.

### **Race Against Time**

Rejewski understood the general mechanics of the machine. He knew that it consisted of mechanical elements, many gears, and electric elements. The first rotor had the alphabet letters written around the dial face with metal elements allowing electricity to flow. Pressing keys caused the rotors to turn and illuminate specific letters. An average person would see only coincidence in this game; Polish mathematicians thought differently. As if that was not enough,

the Germans protected themselves even more, and every day they changed the so-called daily code. In the morning, all the units received information about the rotors' initial positions. As a result, all machines spoke the same language. In practice, it meant that the code was partially changed every day and had to be broken anew!

When breaking new ciphers, they started looking for something characteristic in the messages - some repetitions or a stable structure. It turned out that each Enigma operator had to repeat any three letters twice at the beginning of a message. Knowing this, the Poles looked for a connection between the encoding of the characters. Having many messages, they could decode all the letters, but they had to hurry. The next day the daily codes were different. An actual race against time. Helpful were... the ciphers themselves who, out of laziness, chose combinations of consecutive letters or the initials or names of their beloved ones. Thanks to that, the Enigma's cipher was broken for the first time on New Year's Eve 1932.

Lazy ciphers were punished as their superiors knew well that taking shortcuts was a simple way to break ciphers. It was a real test of strength in remote intelligence centers. Mathematicians in Warsaw decided to act "lavishly." Rejewski invented the cyclometer, a device that searched all possible rotors' settings of rotors. As a result, in the morning, the daily code was deciphered in less than 20 minutes. In response, the Germans improved the entire communication system by changing the message format, the initial coding, and the frequency of rotor changes. It was then that Rejewski decided to construct a bomb. Yet, not the one with explosive material! The bomb was a system of six copies of Enigma looking for dependencies in encrypted messages and finding the correct keys. Cryptologists in this period did titanic work, invented many methods of breaking ciphers, and developed several new mathematical theories.

### **Unused Talent**

Unfortunately, at some point, the Polish intelligence service could not afford further work. The invaluable decryption methods and the complete documentation were to be handed to the English and French intelligence.

After World War II broke out, the whole Cipher Bureau had to evacuate to Romania. Rejewski and his friends made their way to France, where they worked on the decryption of cipher machines other than Enigma. After their station was compromised, the friends decided to evacuate in groups of several people. Rejewski and Zygalski wandered all over Europe until they reached Great Britain, where they surrendered under the orders of the Polish army. The third of their friends, Jerzy Różycki, died in the turmoil of war. In England, the work on Enigma was going on at best, but it had the strictest secrecy clause. Poles were not allowed to work on it. After the war, the English took all the credit for breaking German ciphers. Rejewski was released from service and could return to the country where his wife and children were waiting for him. He worked as a physical worker, and nobody knew about his role in solving the greatest secret of World War II. In 1973, the British declassified the information of breaking the Enigma code by Poles. Only then could Rejewski start writing articles and memoirs on this subject.

马里安·雷耶夫斯基 Marian Rejewski (1905 – 1980)

他是一位杰出的数学家。虽然在二战时没有拿起枪，但他在战争中拯救了数百万人的生命。借助于他的工作，战争持续的时间缩短了几年。如果不是因为……他的工作是秘密的，他当然可以成为英雄！此外，任何人想把他的功劳归于自己都是枉然的。

在第一次和第二次世界大战期间波兰情报部门有很多工作要做。德国打破了凡尔赛条约，秘密地扩建军队。德国指令和报告数量迅速增长，同时他们开始以新的、前所未有的方式进行编码。现代化的密码学依赖高级数学：概率演算和排列运算。为了掌握西部边界外发生的事情，波兰需要一批才华横溢的数学家。

不存在不可能

1929 年总参谋部的军官们招揽了波兹南大学数学研究所的 20 多名学生学习秘密的军事密码学课程。为什么是这所大学呢？来自德意志帝国统治下的普鲁士分区的学生懂德语，因为在当地的学校德文是必修课。语言能力很关键。实习生当中马里安·雷耶夫斯基、耶日·鲁日茨基(Jerzy Różycki)和亨里克·佐加尔斯基(Henryk Zygałski)是最出色的。雷耶夫斯基 1905 年出生于比得哥什，实习时已读大学末年。他们三位的考试成绩都很好，同时他们也适应了在大学的职责。从大学毕业之后雷耶夫斯基开始在波兰军情局密码处工作。对周边的人来说他和他的同学是普通的大学员工，但业余时间，他们都可以随时下去到市本部地下室，所谓的黑书房，在那里他们可以在白天或者晚上的任何时间专注于研究密码。

两年之后该情报机构停止运行，最杰出的员工，包括马里安，被转移到华沙军情局密码处。就在那里他们遇到最强壮的对手。恩尼格玛密码机 Enigma（希腊语：谜语）最初是作为商业信函加密机为民用市场开发的，但很快被德军改编和改进。事实上，有很多这样的机器，但如果所有的机器都使用相同的设置，那么每台机器都可以解码来自另一台机器的消息。想要加密消息的操作员依次按下带有适当字母的按键。当一个键被按下后，电流会流过通路，最终点亮其中一个灯，这个灯显示的就是加密后的字母。乍看，密码看起来完全随机，因此外国情报机构认为不可能破译。

与时间赛跑

雷耶夫斯基了解机器的一般操作原理。他知道是由机械部件，许多齿轮及电器元件组成。第一个转子盘上的字母环旁边有小型的金属的原件使电流流过通路。当一个键被按下后转子还会转动，最终点亮显示相应的字母的灯。普通人在这场比赛中只会看到一个巧合，波兰数学家的想法不同。不仅加密，德军每天会更换代码。早上给每个分部下发指示器步骤的设置，使所有的机器同步。这意味着在实践中，密码每天都会部分更改，并且必须再次破解！

如通常破译新密码，就从寻找特性-任何重复或恒定结构-开始。原来每个恩尼格玛操作员必须在消息的开头重复两遍任何三个字母。波兰人知道这个原理而寻找加密的字之间的关系。收集很多信息之后可以解译所有的字母，但他们需要抓紧时间。第二天就要更换当日的代码。实在是与时间赛跑。有帮助的是…编码员自己，懒得编辑更复

杂的密码，就按顺序排列字母或者选择亲人姓名首字母。因此第一个密码在 1932 年元旦的晚上被破解。

懒惰的编码员受到惩罚是因为他们的上司很清楚走捷径是破解密码的简单方法。华沙的数学家尝试了大规模处理办法。雷耶夫斯基发明了记转器，用几分钟时间分析转子所有的设置的机器，有助于破译当日的代码。作为回应，德军完善了整个通讯系统，并改变了信息格式及初始编码和转子变化频率。当时雷耶夫斯基决定制造炸弹。但他的炸弹不含炸药，由六台恩尼格玛的复制品组成的机器，在加密消息中寻找依赖项并能找出密钥。这一时期的密码学家做了一项巨大的工作，发明了大量的密码破解方法，并开发了一些新的数学理论。

### 未被重用的人才

不幸的是，波兰情报机构资源不足无法承担进一步的工作，决定将宝贵的解密方法和所有文件交给英国和法国的情报部门。

第二次世界大战爆发之后波兰军情局密码处必须撤离到罗马尼亚。而雷耶夫斯基与他的同事辗转到达法国。在那里继续进行破译其它密码机。当他们的情报站暴露后，同事们决定分小组撤离。雷耶夫斯基与佐加尔斯基在整个欧洲游荡，直到他们到达英国，在那里他们执行波兰军队的命令。第三个朋友 - 耶日·鲁日茨基 - 死于战争的动荡。在英国对恩尼格玛破译的工作正如火如荼地进行，但它有最严格的机密条款，不允许波兰人接触。战后，英国人对破译德国密码而自称荣耀。雷耶夫斯基退伍返回波兰与妻子和孩子团聚。他找了一份普通工人的工作，没有人知道他在破解最大的战争谜团中做出的贡献。直到 1973 年，在解密了波兰人破解恩尼格玛密码的事实后，他才开始撰写关于这个主题的文章和回忆录。



约瑟夫·霍夫曼 **Józef Hofmann**  
(1876 – 1957)

他出生于奥匈帝国统治下的克拉科夫。是一位十分优秀的钢琴家和作曲家。但同时也是一位潜力无限的发明家。他对-音乐和创新-的激情经常相互作用。约瑟夫经常改进车辆和乐器。他曾亲自建造了汽车并调整了钢琴构造。

## 音乐

八岁的时候，他在华沙音乐厅众多观众面前演奏钢琴曲。十岁的时候就已开始欧洲巡演。他对音乐的热爱胜过一切。十一岁那年前往美国巡回演出。在卡内基音乐厅（世界上最负盛名的音乐厅之一）举办了一场音乐会之后，《纽约时报》发表了一篇评论，其中写道：“这不仅对孩子来说是一次非凡的演出，这样的演出对一个成年人来说也是无比非凡的。”霍夫曼在美国引起了巨大的反响，然后巡演就突然结束被迫取消，由于美国的防止虐待儿童保护协会注意到并宣称十一岁的约瑟夫遭到成年人的虐待。约瑟夫本人否认这种说法并要求巡回演出继续，但无济于事。这件新闻引起了社会轰动。法院最后做出了决定：巡回演出对于儿童太过辛苦，因此必须取消全部还未举办的音乐会。年轻的霍夫曼就这样返回了欧洲，十二岁的时候在柏林学习音乐。十八岁时毕业并被授予了年轻钢琴家的荣誉的奖学金。在音乐生涯发展的同时约瑟夫·霍夫曼也热衷于创造。谁能说音乐和创新是完全不同的东西，而科学思想和人文主义思想是对立的？若有人这么认为，就错了。没有研究证明人的大脑偏向数学或者艺术。实际上每个人天生都是某项领域潜在的天才，而大多数时候是成年人限制了孩子的想象力。看起来约瑟夫·霍夫曼的父母：一个演唱家妈妈和指挥家爸爸很可能没有限制他的想象力。

约瑟夫·霍夫曼是第一位将其作品录制在媒介上的专业音乐家。十一岁时他读到了关于托马斯·爱迪生发明留声机的文章。这似乎是第一台可以在便携式载体上录制并播放音乐的机器。所谓的载体就是锡箔筒。根据声音的不同振动被金刚石尖录音针刻纹于圆筒上。该机器操作原理与后来留声机唱片相似。约瑟夫对这个国外的发明非常感兴趣，于是他给爱迪生写了一封信。当时托马斯·爱迪生已经是全球闻名的发明家，而小约瑟夫当时才十一岁。事实证明这并不重要。爱迪生接受了请求，并确实为霍夫曼录了音。不幸的是，锡箔筒丢失或者被霍夫曼本人弄坏了？在这一次录音之后霍夫曼已不允许录音他的演奏，因为他认为机械录音无法反映音乐的美感和复杂性。直到生命的尽头，他一直致力于发明一种技术能够将听到的音乐真实完整地记录。这变成他真正的痴迷。

## 发明

约瑟夫·霍夫曼拥有七十多项专利权。有一些发明他没有申请专利。只是纯粹地创造出来。例如，他改造了自己的钢琴，因为作为一个身材矮小的人，他在较窄的琴键上演奏得更方便。借助于霍夫曼的发明，钢琴家有可调节高度的凳子。有一次排练中，年轻的霍夫曼盯着节拍器——一种测量歌曲节奏的装置。这种摆动运行激发了他设计出了世界上第一台汽车雨刷器的灵感。他把专利卖给了福特。

汽车创造与音乐是霍夫曼两个最大的爱好。二十五岁时他亲自建造了一辆汽车，并开遍了欧洲。随后几年，三十二岁时他构建了汽车定位系统的原型。该发明在美国专利局被注册，编号为 909 798。他的想法是创造特殊的圆盘，上面缠绕着带有地图的箔片。该地图根据开车的速度翻转。此外，随着车辆驶入城市，地图会跟随比例的变化而显示更详细的信息。

减震器是下一个音乐与汽车相结合的发明。霍夫曼在他的钢琴的改造过程中想起来建造减震器。这个想法最初是想在琴键和击打琴弦的琴槌之间传递力的系统尽可能精确。他要达到的目的是让琴槌敲击琴弦，就像钢琴家用手指敲击琴键一样。汽车悬挂系统，或者更确切地说是减震系统，首先安装在纽约警车上进行测试，当它被证明成功时，它被汽车行业接管。

电钟、螺旋式热水器、几项今天仍在飞机上使用的专利、原油炉或电池中电极再生技术 - 列出约瑟夫·霍夫曼的发明需要花费很长时间。他建造了第一艘旅游摩托艇。

“我想要一艘不听风浪的游艇，开往我想要去的地方。我不想用桨改变方向。我要驾船。” - 他在自己的日记写下来了这句话。

霍夫曼被认为是他那个时代最伟大的钢琴家。这是著名钢琴家阿瑟·鲁宾斯坦或俄罗斯著名作曲家谢尔盖·拉赫玛尼诺夫对他的评价。作为一位钢琴家霍夫曼认识了当时最著名的人物。在他编写的书中向青年人表达：“总是坚持不懈地工作，尽你所能。找一位可靠的老师，并听取他们对您职业生涯的建议。不要屈服于相信成功取决于命运的诱惑。最重要的因素是你的勤奋、你的工作和理想的方向。”

明智的话。

## **Josef Hofmann (1876 - 1957)**

**Josef Hofmann was born in Krakow, which was then part of the Austro-Hungarian Empire. He was an extremely talented pianist and composer, but he was also an inventor with incredible potential. Both of his passions - music and innovation - often intersected. Józef constantly improved vehicles and instruments. He single-handedly built a car and made changes to the design of the piano.**

### **Music**

As an 8-year-old, he gave piano concerts in front of large audiences in concert halls in Warsaw. At the age of 10, he was giving concerts all over Europe. He loved music more than anything. At the age of 11, he went on a tour of the USA. After one of the concerts at Carnegie Hall, one of the most prestigious concert halls in the world, *The New York Times* newspaper published a review that included the words: "his playing was not extraordinary for a child, it was extraordinary for a man." Interest in Hofmann in the United States was enormous. Yet, the tour was canceled. One of the American associations fighting for children's rights stated that the adults were using the 11-year-old Joseph, who was giving concerts. The boy denied it and asked for the possibility of continuing the tour, but it was to no avail. The scandal was hanging by a thread, and the matter had to be pursued by the court. The court ruled that the tour was too demanding and had to be canceled. The young Hofmann returned to Europe and, at the age of 12, began his musical studies in Berlin. He completed them at the age of 18, winning a prestigious scholarship for young pianists.

Parallel to his world music career, Josef Hofmann was passionately constructing. Who can argue that music and innovation are two different tales and that the scientific and humanistic minds lie at opposite poles? If anyone thinks so, they are wrong. No research supports the fact that we have minds capable of either math or art. Everyone is born a potential genius at everything. More often than not, adults narrow down a child's imagination. Well, Josef Hofmann's parents: his mom a singer and dad a conductor, most likely did not narrow it down.

Josef Hofmann was the first pianist and professional musician to record his works on a medium. When he was 11 years old, he read about Thomas Edison's invention of the phonograph. Perhaps it was the first device that allowed sound to be recorded and played back from a portable medium. Rollers covered with zinc foil carried the sound. A special diamond-tipped stylus carved a groove on it, the depth and width of which depended on the recorded sound. The principle of the device's operation was analogous to that of the later gramophone record. This invention from across the ocean intrigued Josef so much that he wrote a letter to Edison. Thomas Edison was already a world-famous inventor, and little Josef Hofmann was only 11 years old. It turned out that it did not matter. Josef managed to persuade Edison, and they recorded the first music piece. Unfortunately, the phonograph rollers were lost. Or maybe Hofmann destroyed them himself? He let himself be recorded only that one time because he believed that mechanical recordings do not convey the beauty and complexity of the music. Until the end of his days, he worked on inventing a technology that would record music as he heard it. That was his true obsession.

### **Inventions**

Josef Hofmann is the author of over 70 patents. Yet, he did not patent many inventions; he simply created them. For example, Hofmann redesigned his piano. As a man of small stature,

he found it better to play on narrower keys. It is to Hofmann that pianists owe their height-adjustable stools. During one rehearsal, the young Hofmann gazed at the metronome - a device that measures the tempo of a piece of music. This pendulum movement inspired him to develop the world's first windshield wipers. He sold the patent to Ford.

Cars and music were two of Hofmann's greatest passions. As a 25-year-old, he built a car himself, which he drove around Europe. A few years later, at the age of 32, he constructed a prototype of a car location system. He registered the invention in the US Patent Office under the number 909 798. The idea was to place a map on a film wrapped around special disks. Depending on the speed of driving, the discs would scroll at different rates. Additionally, the map and its scale would become more detailed as the car entered the city.

Another music-car invention was shock absorbers. Hofmann came up with the idea while modifying his piano. The idea was to make the power transmission system between the key and the striking hammer as precise as possible. The hammer strikes the string just as a pianist strikes the key with his finger. The suspension, or rather cushioning system, was first tested in New York police cars. When it proved its worth, the car industry took it over.

An electric clock, a spiral water heater, several patents still used in aircrafts today, an oil furnace, and technology for regenerating electrodes in batteries - it would take a long time to list Josef Hofmann's inventions. It was he who constructed the first tourist motorboat. "I would like to have a boat that does not listen to the wind and waves. It goes where I want it to go. I don't want to force it with oars to change direction. I will steer it," he wrote in his diary.

Hofmann was considered the best pianist of his time. Famous pianist Artur Schnabel and a famous Russian composer Sergei Rachmaninoff said that about him. Hofmann, the pianist, was also an acquaintance of the most significant people of his era. Addressing young people, he wrote: "Work always with perseverance, striving to give all that lies within your strength. Find a reliable teacher and rely on his advice as to your career. Do not give in to the temptation of the deceptive belief that success depends on fate. The most important factor is your toil, your work, and the wise guidance over you." Wise words.



斯塔尼斯拉夫·乌拉姆 Stanisław Ulam  
(1909 - 1984)

可以毫不夸张地说，波兰天才数学家斯坦尼斯瓦夫·乌拉姆的工作使我们的技术发展成为可能。他的名字通常是在讨论一种应永远结束所有军事冲突的武器的背景下提及的。斯塔尼斯拉夫·乌拉姆与二十世纪最强大的科学家一起建立了美国核武器项目。

### 讨论代替考试

斯塔尼斯拉夫来自犹太家庭。他五岁时第一次世界大战爆发，那个时候他跟父母在维也纳一起住。返回利沃夫之后开始在学校学习。偶然对数学产生了兴趣。他曾经在家里的书房发现了欧拉的《代数的要素》，他开始对这些陌生的字和符号产生了兴趣。他努力理解它们，以及当时很流行的爱因斯坦狭义相对论。十五岁时开始念瓦茨瓦夫·谢尔宾斯基关于微积分学、群论和数论的书。1927 年就读于利沃夫理工大学，他梦想成为一名工程师或机械师。

他的才华很快被发现，他被邀请加入数学家精英群体所谓的利沃夫数学学校。这是一个真正的人才熔炉。乌拉木有机会与当时最聪明的数学家讨论和交流。在一所有名的“苏格兰”咖啡馆花了很长时间与斯特凡·巴拿赫 (Stefan Banach)、斯塔尼斯拉夫·马祖 (Stanisław Mazur)、卡齐米日·库拉托夫斯基 (Kazimierz Kuratowski) 和雨果·斯坦豪斯 (Hugon Steinhaus) 讨论。其中有一次讨论，加上吃饭和休息，持续了十七个小时！

利用自己的科学论文在仅仅六个小时内他就完成了硕士论文！一年之后他通过了博士论文答辩。然后开始周游欧洲，在奥地利、法国和英国的大学听讲座并亲自授课。1933 年希特勒上台后，欧洲犹太人的处境变得十分艰难。因此乌拉姆接受了美国普林斯顿的邀请，一年之后去了哈佛大学。第二次世界大战开始之前斯塔尼斯拉夫设法回波兰探望家人，并把他的十几岁的弟弟带到美国去。这次离开挽救了弟弟的生命。到达美国之后斯塔尼斯拉夫获悉华沙遭到轰炸的消息。他的全家人几乎都死在轰炸下。

### 神秘的提议

由于家庭悲剧，斯塔尼斯拉夫很想参与到对抗纳粹德国的战斗中。他甚至自愿参军，但由于视力不好，他没有被录取。他没有放弃，并不断询问他的科学家同行，如何才能帮助打败侵略者。当时他收到了一位年长同事的来信，询问他是否愿意参与一个神秘的、非常重要的与恒星内部有关的科学项目。斯坦尼斯瓦夫奉命乘火车前往新墨西哥州沙漠中圣达菲附近的一个小拉米车站。就这样他和他的家人最终来到了洛斯阿拉莫斯的一个秘密实验室——美国核弹计划的中心。这个地方是科学家的真正温床。美国政府带来了世界最杰出的数学家和物理学家，包括十多位诺贝尔奖获得者，并不断解决与制造炸弹有关的理论和实践问题，从而决定血腥战争的结局。对于迄今为止还没有接触过物理学的斯坦尼斯瓦夫来说，这是一次全新但引人入胜的经历。正是在那里，乌拉姆进入了严格的世界科学精英。他在与其他知识领域的科学家建立宝贵联系方面的巨大才能很快受到赞赏。就像以前在“苏格兰”咖啡馆那样，通过热烈的讨论和对主题的非常规方法，他能够和他们一起解决问题。1945 年，当两枚核弹落在日本城市广岛和长崎时，日本被迫屈服并签署了投降书。然而，许多科学家无法原谅自己

的工作最终使成千上万的人丢了性命。当然还有人说，如果战争继续下去，伤亡人数会比这更多。

## 永恒的思想家

第二次世界大战结束后，他成为了猎户座计划的创始人之一，为太空火箭研制核推进系统。同时，他在建造比核弹更强劲的氢弹方面发挥了关键作用。其试验爆炸甚至令军方震惊。氢弹造成的毁灭如此之大，以至于放弃了大规模引进。

乌拉姆的职业生涯迅速发展 - 他成为哈佛大学的教授，当过约翰·肯尼迪总统顾问及许多委员会，如 NASA（美国国家航空航天局）和 IBM（国际商业机器公司）的顾问。尽管他在美国取得了巨大的成功，但他仍对波兰非常热爱，他曾努力普及关于波兰著名的数学家斯特凡·巴拿赫、斯塔尼斯拉夫·马祖的知识。

1984年5月13日，出差回来不久他突然晕倒并最终死于心脏病。直到生命的最后一天，他都在美国和欧洲的研究中心演讲，授课的路上。他被安葬在巴黎。

有一次，斯坦尼斯瓦夫的女儿克拉拉·乌拉姆被问到她的父亲是否和她一起踢过足球。她想都没想就回答，不，她爸爸只是思考，思考，思考。乌拉姆对科学不同的领域做出了巨大的贡献。在他的工作期间撰写了 150 多篇关于概率论、群论、集合论、实数论和数学物理的出版物。一方面他在利沃夫，他在极其抽象的问题上取得了成功，另一方面，他提出了很多解决技术问题的想法和概念。他是将计算机计算引入研究的人之一。乌拉姆提出的蒙特卡罗法一直应用于许多科学领域。可以毫不夸张地说，波兰天才数学家斯坦尼斯瓦夫·乌拉姆的工作使我们正在观察的技术发展成为可能。借助于波兰杰出的数学家斯坦尼斯瓦夫·乌拉姆的工作我们目前可以观察技术发展，这个说法毫无夸张。

## **Stanislaw Ulam (1909 - 1984)**

**It is no exaggeration to say that the work of Stanislaw Ulam, a brilliant Polish mathematician, made the technological developments we now see possible. But most often, his name is mentioned in the context of weapons, which were expected to end all military conflicts forever. For it was Stanislaw Ulam, one of the greatest minds of the 20th century, who supported the American nuclear weapons program.**

### **Discussions Instead of Exams**

Stanislaw's family was of Jewish descent. When he was five years old, the First World War broke out. He survived it with his parents in Vienna. Upon his return to Lviv, he started school. Several coincidences caused him to become interested in mathematics. In his home library, he found the book *Elements of Algebra* by Eurler. He was intrigued by the unfamiliar signs and symbols. He tried hard to understand them just as he tried to understand Einstein's *Special Theory of Relativity*, then widely described. At the age of fifteen, he began reading books by Waclaw Sierpinski on differential calculus, group theory, and number theory. In 1927, he enrolled at the Lviv Technical University, wanting to become an engineer or mechanic.

His talent was quickly recognized. He was invited to join the elite group of mathematicians forming the so-called Lviv School of Mathematics. It was a breeding ground for talent. Ulam had the opportunity to discuss and exchange ideas with the most brilliant mathematicians of his time. He spent many hours in the famous Scottish Cafe talking to Stefan Banach, Stanislaw Mazur, Kazimierz Kuratowski, and Hugo Steinhaus. One of these discussions, with snack breaks, extended to 17 hours!

He wrote his master's thesis, using his scientific papers, in just six hours! A year later, he had already defended his doctoral degree. He then traveled throughout Europe, listening to lectures and giving them himself at Austrian, French, and English universities.

After Hitler came to power in 1933, the situation for Jewish people in Europe became complicated. Ulam, therefore, accepted an invitation to Princeton in the USA, and after a year, he moved to Harvard. Just before the beginning of the Second World War, Stanislaw managed to visit his family in Poland and take his teenage brother overseas with him. The trip saved the brothers' lives. Shortly after arriving in the United States, Stanislaw learned about the bombing of Warsaw. Almost all of his family members were killed.

### **Mysterious Offer**

Due to a family tragedy, Stanislaw desperately wanted to get involved in the fight against Nazi Germany. He even volunteered for the army but was not accepted due to his poor eyesight. He did not give up and kept asking his fellow scientists how he could help to defeat the aggressor. He received a letter from his older colleague asking if he would like to get involved in a mysterious strategic scientific project that had something to do with the interior of stars. Stanislaw was instructed to come by train to the small station of Lamy, near Santa Fe, in the desert in the state of New Mexico. That's how he and his family found themselves in the secret laboratory at Los Alamos - the center of the American nuclear bomb program. It was a veritable hotbed of scientists. The Americans brought here the most brilliant mathematicians and physicists, including a dozen Nobel Prize winners. They solved the theoretical and practical problems related to the bomb's construction, which was to determine the outcome of the bloody

war. For Stanislaw, who had not been involved in physics until then, it was a new but fascinating experience. It was there that Ulam entered the top elite of world science. His great talent for making valuable acquaintances with scientists in other fields of knowledge was quickly recognized. It turned out that through lively discussions and unconventional approaches to subjects - as he once did in the Lviv Scottish café - the entire team would come up with a solution to a problem. In 1945 two nuclear bombs fell on Japanese cities: Hiroshima and Nagasaki. Japan was brought to its knees and signed the surrender. Nevertheless, many scientists could not forgive themselves for having played a part in the tragedy of thousands of people. Others said that had the war continued, the number of casualties would be dramatically higher.

### **Eternal Thinker**

After the war, he was one of the founders of the Orion Program, the development of nuclear propulsion technology for space rockets. He was also a key figure in the team building an even more powerful bomb than the nuclear - the hydrogen bomb. Its test explosions caused shock even among the military. The enormity of the destruction was so great that large-scale deployment was abandoned.

Ulam's career gained momentum. He became a professor at Harvard, was an advisor to President John Kennedy and served as a consultant to various committees and corporations, such as NASA and IBM. Despite his great success in the United States, he felt a great attachment to Poland. He tried to popularize the knowledge of the great Polish mathematicians Stefan Banach and Stanislaw Mazur.

On May 13, 1984, he suddenly fainted and died of a heart attack just after returning from another trip. Until the last day of his life, he traveled around scientific centers in America and Europe, giving lectures, seminars, and colloquia. He was buried in Paris.

Once Klara Ulam, Stanislaw's daughter, who was a few years old at that time, was asked if her father played football with her. She answered without hesitation that he did not and that her daddy would only think, think, and nothing but think. Ulam's contributions to science are unique and span many fields. He wrote more than 150 publications in probability theory, group theory, multiplicity theory, real number theory, and mathematical physics during his career. On the one hand, he was successful in Lviv in extremely abstract problems. On the other hand, he was the author of countless ideas and concepts that solved technical issues. He was one of those who introduced computer calculations into research. Among other things, he created the Monte Carlo method, which is still used today in many fields of science. There is absolutely no exaggeration in saying that the work of Stanislaw Ulam, a brilliant Polish mathematician, made the technological development that we see now possible.



扬·柴克拉斯基 Jan Czochralski (1885 – 1953)

没有他，就没有电脑，也没有互联网。没有 Facebook 以及我们目前所用的一切。无法想象没有电子产品的世界。今日，没有以处理器为核心的设备，就没有媒体，没有汽车和飞机。现代城市无法运转，因为微处理器控制灯光的变化或电力及水的供应。没有他医院和银行也没法存在。

等一等。怎么会没有医院、汽车和飞机？这一切在电脑发明之前都已存在了。没错，但是过去的技术和工程与今日的技术完全不同。汽车开得更慢，并且数量也少的多。医院没有复杂的检测与救生设备。过去的飞机也没有承载数百万乘客。银行也不例外。你能想象没有电脑的银行吗？所有交易、利息、贷款和存款都列在纸质账簿中的银行？

扬·柴克拉斯基, 杰出的波兰化学家和工程师，他的研究推动了电子行业的发展。虽然他的科学作品被引用的次数是世界上最多的，但在波兰几乎无人知晓。同时一考虑到他的成就一在每个城市应该有以他的名字命名的街道或公园。太空探测器应该以他的名字命名。如果扬·柴克拉斯基活在今天，并拥有一个有高效的经理人，他就会建立一个类似于谷歌、Facebook 或苹果的强大公司。

## 敏锐的科学家

扬·柴克拉斯基出生于 1885 年 10 月 23 日比得哥什附近。当时是德意志帝国统治下的普鲁士分区。他是木匠家庭中八个孩子中之一。从小扬就对化学感兴趣。不过 – 委婉地说 – 他父母不太喜欢他所进行的不太安全的实验。出于这个原因，刚满 16 岁，父母就“说服”他搬到克罗托申。在那里扬开始在药店工作。十九岁时他前往柏林，并在当地的德国 AEG 公司的科研中心开始工作。公司在十九世纪及二十世纪的时段生产电器，尤其是灯泡。柴克拉斯基工作地位不高，由于他的教育学历不高，但他很勤劳，并且喜欢学习。抵达柏林仅 6 年后，他就在当地理工学院的化学系为他的工程论文答辩。1916 年，他三十一岁时有了整个生命中最大的发现，确切地说是本世纪的发现。据说，做笔记时他不知不觉错将钢笔浸入熔化锡的坩埚中。在那个年代，没有圆珠笔，钢笔必须时不时地浸泡在墨水容器中。做笔记的时候扬把笔尖浸入含熔化的金属的容器里。当他发现自己的错误，他立即将笔拿出来以及一根细金属棒。就是这样！许多人犯了这样的错误之后会默默地咒骂。有的人会笑，还会跟别人分享他们错误的结果。然而柴克拉斯基对他所获得的效果感到满意。一些探险家的天才之处在于他们能考虑其他人会忽略的东西。柴克拉斯基之前应该有不少人已发现当物体浸入熔融金属中，然后将其取出时沿着该物体拉着一根冷却的金属的“线”。

金属怎么会以如此奇怪的方式冻结？这是否适用于所有金属？从此令人难忘的错误，柴克拉斯基开始测量金属及其合金的凝固（结晶）速率。通过提取制造金属晶体的方法（正如柴克拉斯基心不在焉地做的那样）非常有趣。以这种方式形成的晶体具有非常有序的结构。组成它的原子以严格指定的方式排列。不仅指定的，而且规范的。起初只是冶金学家感兴趣的好奇心，但多年后它却成为一个全新领域—电子学的基础。

电子学离不开薄层晶体硅。不过，这种材料中的原子必须非常有序。没有比柴克拉斯基发明的更好提炼单晶硅的方法。当扬将钢笔浸入熔化的锡而不是墨水时，他不可能知道这件事。说实话，他认为对结晶的研究有趣，但不太实用。他后来靠别的东西赚到了钱。

## 返回波兰

扬·柴克拉斯基获得科学经验的时代（在十九世纪和 20 世纪之交）对于热爱科学和技术的人来说绝对是惊人的。工业革命开始加速，随之而来的是对快速并可靠运输的需求开始增长。在那个年代铁路最方便。不过，铁路有自己的限制，与用于制造铁轨、车轮和火车结构部件的金属较差的质量和价格有关。

不到四十岁扬发明了非常适合构建滑动轨道轴承的合金。以前使用的合金会很快磨损，而且含有锡。锡的价格很高。柴克拉斯基的金属更结实也更便宜。他的专利立刻被德国铁路公司购买，利用此合金他们可以提高火车的行驶速度。扬·柴克拉斯基借助于所谓的 *bahnmetal*，即铁路金属（通常称为其合金），成为富有且受人尊敬的人。他的名气不限于德国，甚至传到了美国。应世界著名汽车品牌福创始人主亨利福特的邀请，柴克拉斯基乘船去美国。在那里他被大亨兼汽车制造商应聘为冶金厂厂长的职位。柴克拉斯基谢绝了。相反，他接受了与返回波兰有关的另一个工作机会。

1918 年波兰重获独立。几年后，由于伊格纳兹·莫希齐茨基总统（他本人也是一位著名且受人尊敬的化学家）的倡议和权威，散布在世界各地的科学家和工程师们开始回波兰。扬·柴克拉斯基是在这个背景下返回华沙，更具体地说回到华沙理工大学。首先他担任了合同教授的职位，然后成为正教授。他还放弃了德国国籍。这位科学家不仅在崭新祖国的首都感觉很舒适痛快，而且还在华沙纳比拉卡街买了一座宫殿。该宫殿也成为首都文化和社会版图上的一个重要点。柴克拉斯基邀请了公认的权威和有前途的科学家。两次世界大战期间波兰的精英全部都拜访了他。他为有才华的青年提供了奖学金，捐资修复位于热拉佐瓦沃拉的肖邦的故居，他甚至为比斯库平遗址考古工作提供了融资。不幸的是，1939 年第二次世界大战爆发了。

## 悲惨的结局

由于他在柏林的人脉，他挽救了许多科学家的生命。柴克拉斯基认识德国最重要的科学家。毕竟他在德国工作了许多年，并且在那里，借助于他的专利权，赢得了世界的认可。战争期间，他没有离开华沙，但他利用了他年轻时获得的人脉联系。尽管有敌意，他在华沙理工大学的研究工作仍在继续。德国人关心他的研究，因为柴克拉斯基的研究对进行军事行动很有用。另一方面，只因为他的研究对德国人有高价值，柴克拉斯基能够雇佣很多人（同时救了这些人的生命）。重要的是，流亡的波兰当局以及地下当局都知道柴克拉斯基拯救人们的生命，并允许他一直从事科学工作。柴克拉斯基的钱和人脉不仅拯救了科学家，甚至拯救了艺术家和与科学或文化无关的人。这一切对战后共产党当局来说并不重要。在人民共和国的头几年，波兰共产党当局指责这位杰出的教授与德国占领者合作。战后柴克拉斯基因叛国罪入狱。

对他不利的是，由于未能完成其中一项手续，放弃德国国籍的程序尚未完成。在共产党人眼中，柴克拉斯基是德国特工。尽管调查人员询问获救者的姓名，这位科学家不愿透露更多。他担心他们也会受到惩罚。柴克拉斯基首先对抗德国占领者，然后在共产党面前保护他人。尽管他被释放出狱（由于没有任何与德国合作的证据），但他被剥夺了工作和学术头衔。虽然他在战争中幸存下来，但他不得不离开华沙，因为找不到工作。回到自己的家乡比得哥什附近的克西尼亚镇，并在那里成立了一家小型的家族企业 *Bion*。他生产了鞋油、理发产品、化妆品和腌肉用的盐。毕竟，他是一位非常有天赋的化学家。共产党当局从所有百科全书中删除了柴克拉斯基，华沙理工大学也不承认他是教授。同时，这个人不仅在科学上表现出才华，而且在商业上也表现出才华。他的公司发展越来越强大，收入也很好。这使得柴克拉斯基的敌人又再次找上门

来。1953 年，在他的家和办公场所被进行的非常残酷的搜查时，这位企业人家兼世界知名科学家心脏病发作。不久之后，于 1953 年 4 月 22 日逝世。

柴克拉斯基去世时世界才开始赞同他的提炼单晶硅得方法。几乎可以肯定，几年后，当半导体电子学的潜力被实现时，柴克拉斯基将会成为诺贝尔奖获得者。他发表了 120 多篇论文，因此他是科学著作中被引用次数最多的波兰科学家。在人民波兰时期直到 1970 年，即在他去世 17 年后，百科全书中首次提及柴克拉斯基！华沙理工大学直到 2011 年才恢复他的教授的职务—在他的头衔被剥夺，并被可耻地解雇了 66 年后！

## Jan Czochralski (1885 - 1953)

**There would be no computers or the Internet without him. There would be no Facebook and everything that we love to use. It is impossible to imagine a world without electronics. Today, there would be no media without devices equipped with a processor. There would be no cars or airplanes. A modern city would not function because microprocessors control the changing of lights and supply of electricity and water. There would be no hospitals or banks.**

Wait a minute. What do you mean there would be no hospitals, cars, or airplanes? After all, all of those things worked before there were computers. That is true, but the technology used to build them was very different than today. Cars moved slower, and there were far fewer of them. Hospitals didn't have complex research and life-saving equipment; airplanes did not carry millions of passengers. The same applies to banks. Can you imagine a bank without computers? A bank where all transactions, interest, loans, and deposits are recorded in paper books?

Jan Czochralski, a brilliant Polish chemist and engineer, made the development of electronics possible. Even though he is the most quoted Polish scientist globally, he is almost unknown in Poland. Meanwhile, considering his achievements, he should have a street or a park named after him in every city. Also, space probes should carry his name. If Jan Czochralski had lived in today's times and had an efficient manager, he would have built a giant similar to Google, Facebook, or Apple

### Perceptive scientist

Jan Czochralski was born on 23 October 1885 near Bydgoszcz. At that time, this part of Poland was ruled by Prussia. He was one of eight children born to a family of carpenters. Jan showed interest in chemistry since childhood. Mildly speaking, his parents did not like his experiments, which were not entirely safe. For this reason, as soon as he was 16 years old, they "convinced" him to move to Krotoszyn. Jan began working in a pharmacy. When he was 19 years old, he went to Berlin and started working in the German concern AEG's research center (as we would call this today). At the turn of the 19th and 20th centuries, the company produced electrical equipment, including light bulbs. Czochralski did not have a high position at work due to a lack of proper education. However, he was hardworking and liked to learn. Only six years after arriving in Berlin, Jan defended his engineering thesis at the chemical faculty of the local polytechnic.

In 1916, at the age of 31, he made the most profound discovery of his life. Or rather, the discovery of the century. An anecdote says he was so absent-minded that he dipped this fountain pen nib in a crucible with melted tin instead of an ink bottle while taking notes. In those days, people did not write with pens we know today. The fountain pens had to be dipped in an ink bottle now and then. However, the bottle in which Jan inserted his nib contained molten metal. As soon as he realized this, he took out the nib along with a thin metal rod clinging onto it. That was it!

Probably many people would curse quietly under their breath after such a mistake; others would have laughed, told, or shown their friends the result of their error. However, Czochralski was delighted with what he saw. The genius of some discoverers is that they begin to think about what others would ignore. Probably Czochralski was not the first to notice that by dipping an

object in molten metal and then taking it out, they were pulling a "thread" of cooling metal behind it. What is interesting about this? For Czochralski, it was a crucial moment in his scientific career. Thanks to this discovery, he is probably the most quoted Polish scientist in the world today.

How does it happen that metal solidifies in such a strange way? Does it concern all metals? Since that memorable mistake, Czochralski began to measure the solidification (crystallization) rate of metals and their alloys. The method involving the formation of metal crystals by pulling (which is how Czochralski did it by absentmindedness) was fascinating. The crystal formed in this way had a very ordered structure - the atoms were arranged in a strictly defined manner. Not only was this manner determined, but it was also regular. What at the beginning was only a curiosity, which metallurgists were interested in, turned out to be the foundation of an entirely new field, which became electronics. Thin layers of crystalline silicon are essential in electronics. However, the atoms in this material must be very ordered. There is no better method to create perfect crystals of silicon than the one developed by Czochralski. Jan himself could not have known when he dipped his nib in molten tin instead of ink. In fact, he considered his work on the crystallization of metals interesting but not very practical. He made his real money from something else.

## **Return to Poland**

The times when Jan Czochralski was gaining his scientific experience (the turn of the 19th and 20th centuries) were impressive for someone in love with science and technology. The industrial revolution was beginning to accelerate, and the need for fast and reliable transport was growing. In those days, the best way to get around was by rail. However, it had some drawbacks that stemmed from the poor quality and price of the metals used to build the trains' rails, wheels, and structural components.

At less than 40 years of age, Jan developed an alloy that was ideal for constructing railroad sliding bearings. Previously, an alloy used wore out quickly and contained tin, which was very expensive. Czochralski's alloy was more durable and cheaper. German railroads immediately bought the patent because it allowed them to increase the trains' speed. Jan Czochralski became a wealthy and respected man thanks to the so-called *bahnmetal*, or railroad metal (as his alloy was commonly called). He was respected not only in Germany but even overseas. At the personal invitation of Henry Ford, the owner of the world-famous automotive brand Ford, Czochralski sailed to the USA. There, he was offered the position of director of a metallurgical plant, which belonged to the magnate and car manufacturer. Czochralski, however, declined. Instead, he accepted another offer, which was related to his return to Poland.

In 1918, Poland regained its independence. A few years later, thanks to the initiative and authority of President Ignacy Moscicki (who was himself a well-known and respected chemist), the scientists and engineers scattered all over the world by the winds of history began to return to Poland. Jan Czochralski also returned to Warsaw, precisely to the Warsaw University of Technology. First, he took the position of a contract professor, and later, he accepted the title of full-time professor. Czochralski also renounced his German citizenship. The scientist found himself in the capital of the new country. He bought a palace located in Warsaw's Nabelaka Street, which became an essential point on the cultural and social map of the capital. Czochralski invited both recognized figures and promising scientists. The entire elite of interwar Poland visited him. He financed scholarships for talented young people, donated money for the restoration of Chopin's manor in Żelazowa Wola, and even funded archaeological work in Biskupin. Unfortunately, in 1939 the war broke out.

## **A tragic end**

Thanks to his contacts in Berlin, he saved the lives of many scientists. Czochralski knew the most important German scientists. After all, he worked in Germany for many years, and it was there that he gained world recognition for his patents. He stayed in Warsaw during the war and benefited from friendships established in his youth. Despite the warfare, he continued the research at the Warsaw University of Technology. The Germans were interested in it because Czochralski's works were helpful in the war effort.

On the other hand, precisely because the research was so valuable to the German army, Czochralski managed to employ many people (thus saving their lives). Importantly, the Polish authorities in exile and the underground authorities knew that Czochralski was saving people's lives and allowed him to continue his scientific work. The Czochralskis' money and contacts saved scientists, artists, and people outside the world of science or culture. The whole family of the scientist was involved in helping the repressed. However, this did not matter to the post-war communist authorities. In the first years of the People's Republic of Poland, the newly formed government accused the distinguished professor of collaboration with the occupying forces. After the war, Czochralski found himself in prison suspected of treason. His situation was even worse as the procedure of renouncing German citizenship was not completed due to formalities. For the communists, Czochralski was a German agent. Although the investigators asked for the names of the rescued, the scientist did not want to give them. He was afraid that they would also be punished. Czochralski defended people first against the German occupants and then against the communists. Although finally released from prison (there was no evidence of cooperation with the Germans), he was deprived of his job and academic titles. The Warsaw University of Technology authorities cut him off, stripped him of his position, and banned him from lecturing and conducting scientific research. Although he survived the war, he had to leave Warsaw because he could not find a job there. He returned to his hometown Kcynia, near Bydgoszcz, and founded a small family company Bion. He produced shoe polish, hairdressing cosmetics, and salt used for curing meat. After all, he was a very gifted chemist. The communist authorities removed Czochralski's name from all encyclopedias, and the Warsaw University of Technology did not acknowledge its professor.

Meanwhile, Czochralski showed not only his scientific talent but also his business flair. His company grew in strength and earned very well. Czochralski's enemies could not leave this without reaction. In 1953, during a fierce search of his home and company premises, the owner and world-famous scientist suffered a heart attack. Shortly after, he died on April 22, 1953.

As Czochralski was dying, the world was beginning to appreciate his method of growing monocrystals. It is almost certain that a few years later, when the potential of semiconductor electronics was recognized, Czochralski would be awarded the Nobel Prize. He left behind over 120 publications, making him the most cited Polish scientist in scientific papers. Meanwhile, in the People's Republic of Poland, the first encyclopedic reference to Czochralski did not appear until 1970, 17 years after his death! The Senate of the Warsaw University of Technology rehabilitated Czochralski only in 2011 - 66 years after they deprived him of his degrees and disgracefully dismissed him!



米切斯瓦夫·贝克 Mieczysław Bekker  
(1905 – 1989)

若没有像贝克教授那样的人，世界汽车行业发展不会是今天的样子。尤其是征服月球会不一样。因为波兰工程师制造了在月球上表现良好的漫游车。虽然他本人是世界一流的越野车制造师，但他对科学的兴趣始于他在阁楼上找到的一本书。

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他是一位杰出的越野车制造家。美国和加拿大的军队寻求与他合作。其实米切斯瓦夫·贝克最闻名于他对征服月球的贡献。他出生于赫鲁别舒夫，但他在科宁上过学。是他的父亲引起他对技术和太空的热爱。米切斯瓦夫和他的弟弟喜欢一起观赏月亮和听他父亲谈论星星和行星。三位贝克先生 - 父亲和他的两个儿子 - 在一棵树上建了一个平台，实际上是一个小型天文台。他们使用双筒望远镜的透镜建造了一个简单的天文望远镜。许多年之后贝克教授回忆这个时刻说当时在观测月亮时感觉他能触摸得着它。当时他很可能连做梦都想不到他未来所建造的车辆能够行驶在月球表面。

望远镜和天文台并不是贝克尔兄弟建造的唯一结构。有一年夏天，他们制作了利林塔尔滑翔双翼飞机的复制品。这架覆盖着胶合报纸的结构从未经过测试，因为兄弟们没有勇气进入。也许这是一件好事。

技术、物理和数学—这些科目是米切斯瓦夫不必学习的。自然而然就会了。转换公式和解决数学问题是未来的发明家的乐趣之一。据说贝克家院子的木头大门上满是数学公式。

## 战争

当米切斯瓦夫·贝克还在读高中时，他偶然在学校的阁楼里发现了一个装有旧书的盒子。其中之一是 1880 年出版的一本关于天文学基础知识的书。正如他自己回忆的那样，从那时起，他就无法停止思考行星、卫星和恒星。

他离开科宁前往华沙学习，具体是在华沙理工大学。他选择了汽车专业，与著名的波兰 RWD 飞机的设计师一起答辩。毕业之后他开始为波兰军队制造越野车。由于世界大战爆发，因此项目无果而终。他穿越罗马尼亚到达法国。在那里被巴黎军备部坦克司立刻应聘为专家。法国投降后，加拿大人找到了他，并立即聘请他前往渥太华的装甲研究局。

在那里他终于开始对越野车的研究。他研究了各种类型的驱动、悬架和转向系统。1950 年代中期，美国军方说服他更换雇主。当他成为平民时，美国最好的大学和理工学院为他提供工作机会。虽然他在许多大学讲学，但他在工业界找到了工作。他成为世界汽车巨头通用汽车研究所所长。在那里他开始了月球漫游车制造。这个挑战异常艰巨。如何打造一辆既能载重物又能让身着宇航服的人乘坐舒适安全、轻而不陷入月土、又可折叠方便运输的交通工具？另一个困难是无法使用内燃机，因为月球上没有大气层，所以汽油在发动机中燃烧所必需的氧气也没有。此外，车辆的轮胎不能用橡胶制成，因为这种材料将无法承受月球表面上的巨大温度浮动（从+110 摄氏度到 -80 摄氏度）。

85 家公司参加了美国宇航局公布的竞赛。米切斯瓦夫·贝克教授的设计获胜。有趣的是，其他招标的工程组成员当中也有一些波兰人。

## 月球

贝克的月球车长约 3.5 米，宽约 1.8 米。重量仅 200 公斤，但可以在月球上承载 500 公斤的负载。贝克利用了后来在电动车和动车常用的技术方案，为每个车轮安装单独的电动机。这辆车的表现非常好，以至于它在没有任何升级的情况下连续执行了三次阿波罗任务：阿波罗 15 号、16 号和 17 号任务。

贝克本人表示，最大的挑战是建造不陷入月球土壤的车轮。这个问题十分复杂，因为月球重力较小，松散的表面地球表面不同。其实，火星探测器的设计师不止一次遇到这个问题。在火星上车轮的运作与设计师的预计不同。贝克的月球漫游车连一次都没有陷入，轻松地爬坡，而太空人经常提到过说，开这辆车又方便又好玩。贝克用像弹簧一样扭曲的钢琴弦制造了漫游车的轮子，并用钛板加固。

在贝克这些年的办公室里（他退休之后放在他的车间里），挂着一本他在初中时读过的一本关于宇宙的书的复制品。1989 年贝克在美国逝世。

在波兰他不为人知，在美国，他的名字写在征服太空的功绩大道上，阿波罗计划的大多数宇航员都是他的朋友。每辆四轮驱动越野车都用波兰人发明的技术解决方案。他的书《陆地运动理论》是任何汽车制造者的必读之书，确定土壤松散度的单位用他的名字命名。战后他来过波兰几次。每次都强调了父母和老师培养他的爱好方面发挥的重要作用。

## **Mieczysław Bekker (1905 - 1989)**

**Without people like Professor Bekker, world motorization would look different. And the conquest of the Moon would look different for sure. It was a Polish engineer who built rovers, which were very successful on the Silver Globe. And although he was a world-class designer of off-road vehicles, his interest in science began with a book he found in the attic.**

He was an outstanding designer of off-road vehicles. The armies of Canada and the USA wanted to cooperate with him. However, Mieczysław Bekker is best known for what he did to conquer the Moon. He was born near Hrubieszów, but his school was located in Konin. Love for technology and space was instilled in him by his dad. Together with his younger brother, Mieczysław loved admiring the disk of the Moon and listening to their dad talking about the stars and planets. Three Bekkers - a father and his two sons - built a platform, actually a small observatory, in a tree. Using binocular lenses, they also constructed a simple telescope. Many years later, Professor Bekker said that while observing the disk of the Moon, he felt as if he could touch it with his hand. At that time, he probably did not even dream that the vehicles he built would drive people around the Moon's surface.

The telescope and observatory were not the only structures the Bekker brothers built. One summer, they created a replica of Lilienthal's biplane glider. The design, covered with glued newspapers, was never tested because the brothers lacked the courage to get into it. Maybe that was a good thing.

Technology, physics, and mathematics - these were subjects that Mieczyslaw did not have to learn. The knowledge smoothly slid into his brain. One of the hobbies of the future inventor was transforming formulas and solving mathematical problems. He is said to have covered the wooden gate leading to the backyard of the Bekker house with mathematical patterns.

## **War**

When Mieczysław Bekker was still in middle school, by some coincidence, he found a box with old books in the attic of his school. One of them was a book with the basics of astronomy published in 1880. As he recalled, he could not stop thinking about planets, moons, and stars from that time on.

From Konin, he went to Warsaw to study, specifically at the Warsaw University of Technology. He chose the specialization in automobiles. He defended his diploma with the constructors of the famous Polish RWD airplanes. After graduation, he started to design off-road vehicles for the Polish army. Unfortunately, not much came out of it because the war broke out. He escaped to France via Romania, where the Ministry of Armament in Paris immediately employed him as a specialist in the Tanks Department. When France capitulated, the Canadians evacuated him and immediately hired him at Ottawa's Armoured Weapons Research Office.

It was there that he eventually began to conduct work on off-road vehicles. He researched various types of drives, suspensions, and steering systems. In the mid-1950s, the US Army persuaded him to accept their job offer. When he retired to civilian life, the best American universities and technical colleges offered him jobs. Although he lectured at many of them, he was an industry employee. He became the director of the research institute of the global automotive giant, General Motors. It was there that he took up the task of building a lunar rover. The challenge was extremely difficult. He had to build a vehicle capable of transporting heavy loads, comfortable and safe for people dressed in restrictive suits, lightweight, that would not

bury in the lunar soil, and foldable so that it could be conveniently transported. An additional difficulty was the inability to use an internal combustion engine because there is no atmosphere on the Moon and no oxygen necessary for burning gasoline in the engine. If that wasn't enough, the wheels of the car couldn't be made of rubber because this material would not withstand the large temperature fluctuations that occur on the surface of the Moon (from +110 to -80 degrees Celsius).

Eighty-five companies entered the competition announced by NASA with their designs. Professor Mieczysław Bekker's design won. What is interesting, there were also several Poles in other teams.

## **Moon**

Bekker's lunar vehicle was nearly 3.5 meters long and 1.8 meters wide. Weighing only 200 kg, it could take a 500 kg payload to the Moon. Bekker applied a solution that was later applied not only in electric cars but also in super-fast trains. It consisted in installing separate electric motors in each wheel. The vehicle worked so well that it was used in three subsequent Apollo missions without any improvements. It flew to the Moon with the Apollo 15, 16, and 17 missions.

Bekker himself said that the biggest challenge was to design wheels that would not bury themselves in the lunar soil. It was pretty complicated because, without gravity, the loose surface behaves differently than on Earth. The constructors of Mars rovers learned about it as soon as their designs worked on the Red Planet differently than predicted. Bekker's vehicle did not bury itself even once and quickly climbed slopes. The astronauts themselves repeatedly mentioned that driving was comfortable and provided great fun. Bekker constructed the rover's wheels from piano strings twisted like springs and reinforced with titanium plates.

A replica of a book about space that he had read as a middle school student hung on the wall of Bekker's office for all these years. Bekker died in the USA in 1989.

In Poland, he is unknown. In the USA, his name is inscribed in the alley of merit for conquering space. Most of Apollo's astronauts were his friends. Every four-wheel drive off-road vehicle has a technological solution invented by the Pole. His book *The Theory of Terrestrial Locomotion* is a must-read for any car builder. The unit used to determine the looseness of the ground is named after him. After the war, he visited Poland several times. Each time he emphasized how important a role his parents and teachers played in developing his passion.



史蒂芬·捷维斯基 Stefan Drzewiecki  
(1844 – 1938)

1870 年，儒勒·凡尔纳完成了著作《海底两万里》，那时他肯定没想到，再过几年波兰的尼莫船长就会首次真的在海底航行。这个尼莫船长是史蒂芬·捷维斯基，一个工程师、科学家和发明家，他的字典里没有“不可能”这个词。

## 里程表

捷维斯基小时候是个顽童，据说他很爱对老师恶作剧，所以虽然高考成绩非常好，还是没有拿到高考通过证明，这不幸关上了他的大学深造之路。但这并没有让他放弃求学，而是转往法国知名的技术学校就读。他在学校的邻座同学叫古斯塔夫·埃菲尔，也就是后来建造了埃菲尔铁塔的知名工程师。就是在这个时候，捷维斯基遭遇了人生中最大的波折。当时波兰爆发了一月起义，身为爱国青年，捷维斯基回到了波兰准备参加起义。但他抵达得太晚了，只来得及看到一月起义悲剧的结局。他回到法国以后参加了巴黎居民的革命 - 巴黎公社。巴黎公社失败以后，他搬到了维也纳，当时那里正准备举办展示各种科学与科技成就的世界博览会。

这时候的捷维斯基已经发明了几样东西。1867 年，也就是他 23 岁的时候，他就为他的第一个发明 - 里程表申请了专利。在此之前马车车夫可以向乘客随意开价，而捷维斯基的发明可以计算经过的里程，解决了这个问题。在今日，每辆出租车都配有这样的里程表。另外的发明则跟火车有关，他发明了能测量火车行进速度的仪器，还有能将两节车厢连接起来的自动车钩。这些发明都在维也纳世界博览会上获了奖。

## 水神的礼物

但火车并不是捷维斯基唯一感兴趣的东西。当时的人做梦都想不到，有一天会有像 GPS 这样的东西。以前，船只的位置还有航行路线都是靠船上的军官人工记录在地图上，这需要具备专业能力和专注力，所以经常出错。捷维斯基制造的航线记录仪可以配合罗盘使用，自动画出船只的路线。

捷维斯基在世界博览会上展示的发明，得到了俄国沙皇亚历山大二世的弟弟 - 康斯坦丁大公的注意。他相当欣赏捷维斯基的发明，并愿意提供他优渥的奖学金。改良后的航线记录仪在不久后就开始在军舰上运作，在俄罗斯与土耳其的战争中派上了用场。

但其实捷维斯基最著名的发明还是潜水艇，他是第一个建造出潜水军舰的人。当然，他发明的潜水艇与今日的版本相差甚远，但凡事总得有个开始。这艘潜水艇可容纳一位驾驶员，通过踩动踏板来转动螺旋桨，而这艘潜水艇的实用目的来自一双伸出船身的橡胶手套，让驾驶员可以在水下给敌军的船舰偷装炸弹。后来的改良版潜艇体积更大，可以容纳四名船员，还加装了潜望镜。潜望镜是十七世纪由天文学家约翰·赫维留斯发明的（关于他的故事，请看第...页），捷维斯基则是第一个想到可以在潜艇中使用这个装置的人。

1881 年，捷维斯基在俄罗斯加特契纳附近的湖里展示了改良后的潜艇，沙皇亚历山大三世和皇后也是观众之一。相传他操控潜艇浮出水面，爬上船坞后，送了皇后一束她最爱的兰花，并说道：“这是水神尼普顿给陛下您的礼物”。

到了 1892 年捷维斯基搬到法国的时候，俄罗斯已经拥有一支由约 50 艘潜艇组成的舰队，在那时候这样的规模相当可观。捷维斯基在当时完全可说是潜艇专家。在法国海军部举办的比赛中，他设计的一艘带有空压机鱼雷发射器的潜艇获了奖。这艘潜艇使用的是混合动力，在水上使用蒸汽动力，水下则使用电力驱动。在他设计制造的潜艇中，最大的排水量高达 350 吨。

## 螺旋桨和小鸟

他实现了像鱼一样游泳的梦想以后，就决定要学小鸟飞翔。令人意外的是，这两项能力的原理就物理学来看其实非常相似。捷维斯基对飞行、鸟类飞行研究和滑翔原理都非常有兴趣。这没什么好奇怪的，这样的研究在十九世纪末非常热门。

他出版过几份有趣的相关研究，在这些研究中，他把鸟类描述成小型飞机，并分析了它们逆风滑翔的能力。跟某些同期科学家不同的是，捷维斯基得出了正确的结论。当时流行的看法是让飞行器靠拍动机翼飞翔，而他认为这并不可行。他在自己的研究中专注于螺旋桨在水中和涡轮发动机在空气中的运作。他的研究成了后来螺旋桨飞机的理论基础，莱特兄弟制造的第一架飞机也因此受惠。除此之外，他还写了一份说明，解释如何为特定机型计算最适合的螺旋桨形状及尺寸，这是一份给全世界工程师的大礼，大家都乐意使用他的研究成果。他在 1920 年有关螺旋桨飞机理论的著作中总结了所有的研究，这本著作让他获得了法国科学院的奖项。

但他并不将自己局限于纸上，他自己制造了机体“鸭子号”，内装有新发明的自动飞行稳定器，飞行时由于燃料的消耗，飞机重心会改变，这个装置可以应付这个问题。他的另一个发明在战争时派上用场。他在飞机上装了发电机，有了电以后就可以在机上装设通信系统，也能让炮兵团知道敌军的位置。

捷维斯基并没有满足于这些成就，终其一生都不断地在研究跟飞行相关的新点子，除此之外，他也对新开发的科技产品和技术很感兴趣，发明过 150 多个技术解决方案，90 岁的时候还发表了关于涡轮动力水车的文章。他最后活到了 94 岁。他为人热心，乐于帮助对科技有兴趣的年轻人实现他们的新点子，对波兰工程师后辈也慷慨相助。过世后，他将所有的发明、书籍和工作室都送给了祖国波兰。

## **Stefan Drzewiecki (1844 - 1938)**

**When in 1870 Juliusz Verne wrote *Twenty Thousand Leagues Under the Sea*, he didn't expect that Polish Captain Nemo would start his first underwater voyage just a few years later. That man was Stefan Drzewiecki, constructor and scientist, inventor, and a man who did not understand the notion of "impossible."**

### **Taximeter**

He was quite a rascal. Rumor has it that he loved to play tricks on his teachers. And although he passed his high school exams very well, he did not receive his diploma. That, unfortunately, closed his path to university. But Stefan was not discouraged. He began studying at a prestigious technical school. His schoolmate was Gustave Eiffel, later the famous engineer and constructor of the Eiffel Tower. It was during this period that Stefan experienced a very turbulent episode. When the January Uprising broke out in Poland, as a patriot, he came to the country to join the fight. He arrived too late and could only see the tragic end of the uprising. Upon returning to France, he took part in the Paris Commune, a revolutionary uprising by the people of Paris. After its defeat, he moved to Vienna. The Universal Exhibition was coming up, and it would host scientific and technical achievements.

By this time, he had already made several constructions. He patented his first invention in 1867 when he was 23 years old. It was a taximeter. Until he invented it, a carriage driver could demand any payment from a passenger. Drzewiecki invented a counter showing kilometers traveled. Today, every cab is equipped with such a device. The following inventions were related to railroads. He developed an instrument to measure the speed of a steam locomotive and a machine for connecting wagons. These inventions were awarded at the Vienna Exhibition.

### **Neptune's Gift**

The railroad was not the only thing that interested Drzewiecki. Back then, nobody dreamt about GPS. The ship's position and its route on the map had to be marked manually by the officer on watch. It required skill and attention, so mistakes were quite common. Drzewiecki constructed a device that automatically drew the ship's route using a compass, which he called a dromograph.

When Stefan was presenting his invention at the world exhibition, Prince Constantine, brother of Alexander II, Tsar of Russia, noticed it. The prince was so impressed with the work of the young engineer that he offered him a well-paid scholarship. The improved dromographs were soon used on warships participating in the war with Turkey.

Drzewiecki's greatest fame was as a pioneer of submarine navigation. He was the first to build a war submarine. It was far from today's submarines, but you had to start somewhere. The ship had room for one crewman, who pedaled the propeller. Practicality was added by a pair of rubber gloves sticking out of the hull, which could be used to mount mines under enemy ships. Subsequent versions were more extensive and could already serve four people. They also used a periscope. Periscope was constructed in the 17th century by an astronomer called Jan Hevelius (you can read about him in this book). It was Drzewiecki who came up with the idea of using it in submarine navigation. Drzewiecki personally demonstrated his improved design in 1881 on a lake near Gatchina. Tsar Alexander III and his wife watched the maneuvers. It is said that after launching his boat, Drzewiecki went out and presented a bouquet of Tsarina's favorite orchids, saying: "here is a gift from Neptune for Your Highness."

When he moved to France in 1892, Russia already had an entire submarine fleet of about 50 vessels, which testified to its power in those days. Indeed, the Pole could already be considered an expert in submarines. In a competition of the French Ministry of the Navy, he received an award for designing a submarine with built-in torpedo launchers powered by compressed air. The ship had a hybrid propulsion system - when afloat, it operated on steam propulsion, while underwater, it used electric propulsion. The largest submarine designed and built by Drzewiecki had a displacement of 350 tons.

### **Propellers, Screws and... Birds**

Once he realized his dream of swimming like a fish, he decided to learn to fly like a bird. Despite appearances, these are very similar subjects from the perspective of physics. Drzewiecki became interested in aviation, studying bird flight and developing a theory of gliding flight. No wonder, at the end of the 19th century, it was a very catchy topic, literally and figuratively. He published several interesting papers in which he described birds as living aircraft and explained their ability to glide against the wind. Unlike some scholars, he came to the correct conclusion that the ideas prevalent at the time about flapping winged machines were not valid. His research focused on the operation of propellers in water and turbines in the air. He created the basis for the propeller theory, which was used by the Wright brothers, among others, when constructing the first airplanes.

Moreover, Drzewiecki prepared a manual on correctly calculating the optimal shape and size of propellers for a particular craft. It was an immense gift for engineers from all over the world, which they gladly used. All his research in this field was summarized in a book on the theory of propeller propulsion published in 1920, for which he received an award from the Academy of Sciences.

However, he did not limit himself to paperwork. He built an airframe called Canard, which means duck in French, with an innovative automatic stabilization during flight. In this way, he solved the problem of changing the machine's center of gravity by fuel consumption. Another of his inventions came in handy during the war. Aircraft-mounted generators made it possible to mount radio stations on board and transmit enemy positions to artillery units.

Drzewiecki never rested on his laurels. Until the end of his life, he worked on new aviation ideas. Still, he was also interested in new inventions and technical innovations. He developed over 150 technical solutions. At the age of 90, he published a treatise on water turbine mills. He lived to be ninety-four years old. He was eager to help young enthusiasts of technology and science in implementing their ideas. He generously supported future Polish engineers. At the end of his life, he bequeathed all his works, books, and laboratory to the Polish state.



卡齐米日·普罗申斯基 Kazimierz Prószyński

(1875 - 1945)

他的发明在同类别中当然配得上一座奥斯卡奖。虽然多年后被其他发明超越。一个从小就接触过最新摄影发明的人，由于他的工作，他设计了整个电影界都在使用的设备。没有它，电影摄影的发展会慢得多。

灯光，摄像，开始！

卡齐米日·普罗申斯基的祖父在华沙开了一家照相馆。他的孙子满心好奇地在那里做着各种实验。他把自己照的家庭照片做了展览，甚至在灯光和镜子的帮助下表演了魔术。普罗申斯基小时候有一天在马路上看见了一个实况照片的广告。以 20 戈比的价格，在一个黑暗的房间里展示了 24 张图片，放置在一个旋转的轮子上，营造出运动的错觉。卡齐米日记住了这个看似简单的一匹马跳过横梁的图像，并激发了他未来的摄影工作。

在初中学习期间他开始表现出出色的技术能力，因此在 1894 年，他的父母决定了送他到比利时的理工学院学习。没有等太久，他的第一个发明就有了结果 - 早在他的第一学年，他就建造了一个通用的收发器，一种用于杂志折叠、打包和编址的装置。设计时考虑到他的父亲的需求。这样的装备便利他的工作，提高向订阅者发送他出版的《*Gazeta Świąteczna*》周刊和《*Promyk*》期刊。

不过卡齐米日对电影最感兴趣。市场上现有的用于投影运动图像的相机有一个主要缺点，生成的图像不连续也不均匀。摇晃和闪烁的图像看得很费劲，并且投影经常因设备故障而中断。这都是需要改善的问题！为此他制造了当时世界上最好的投影仪（pleograf），比原来所用过的设备更好。但这仅仅是普罗申斯基一系列发明的开始。普罗申斯基使用他改进的设备 - 传记摄影机（biopleograf）展示了第一部动作片。这种改进包括使用两个镜头和两个磁带，在投影过程中交替投影图像以消除因磁带移动而导致的显示中断。《浪荡鬼的归回》 - 讲一位年轻人喝醉回家的故事以及《马车司机的冒险》 - 马车司机打瞌睡时他的马被带走的故事是 19 世纪和 20 世纪之交的首部高质量电影。都借助于卡齐米日的发明。

哥伦布在巴黎

1908 年，普罗申斯基从比利时理工学院毕业。早些时候，他因专注于发明而中断了一阵学业，并搬到了巴黎。在那里，电影摄影的发展工作如火如荼，因为巴黎 - 作为一个充满剧院、歌舞表演和艺术家的城市 - 渴望被称为“电影之城”。卡齐米日继续致力于消除仍然困扰着他的两个最大问题，就是解决电影放映过程中的闪烁和图像抖动。他的新解决方案采用了闭塞器，即具有三个开槽的光圈，使闪烁是难以察觉的。第二个问题是通过改进磁带推进装置被克服的。想出这个机制很困难，但构建起来却非常简单，因此普罗申斯基改进的照相机和相机受到了电影制作人界的热列欢迎。立即开始量产照相机和相机，并逐渐开始引入电影院。这是整个电影行业的一次突破。之前由于眼睛疲劳，电影持续时间不超过十几分钟，从此之后可以将情节发展成电影，甚至

几个小时的电影。普罗申斯基被称为摄影界的哥伦布。他也受到路易斯·卢米埃（Louis Lumiere）的赏识，并认可了他在技术工艺方面的成就。今天可能很难想象，但当时普罗申斯基的发明引发了一场真正的革命，并成为新兴电影业的推动力。

### 看世界的“眼睛”

普罗申斯基通过构建航空摄影机实现了电影摄影的第二次突破，即第一台没有三脚架的便携式相机，它通过陀螺仪稳定图像。卡齐米日在马鞍上展示了他的发明。通过这种方式，他想表明即使在骑行时也可以获得令人满意的图像。早期的相机又大又重，而且对震动很敏感。这些因素严重限制了摄影师的可能性及导演的想象力。多亏了普罗申斯基，现场拍摄才成为可能，记者的工作也有了新的意义。1911年，这位发明家本人在伦敦录制了一篇关于乔治五世国王加冕的纪录片。英国旅行家和自然研究员切丽·卡顿（Cherry Kearton）用航空摄影机在非洲丛林中拍摄了许多自然电影后，成为了此发明的忠实拥护者。在第一次世界大战期间摄像机使记者能够记录军事行动。卡齐米日的一项突破性发明是有声活动电影机（kinofon）一种将电影摄影机与留声机结合的机器，也就是第一台投射图像并发出声音的投影仪。普罗申斯基的机器甚至超越了发展同样的设备的托马斯·阿尔瓦·爱迪生（Thomas Alva Edison）。从其建成之时起，电影就不必再沉默了。

1914年，普罗申斯基与英国女子多萝西结婚，并育有两个孩子。一家人定居华沙。在接下来的几年里，以及在1939年战争开始后，普罗申斯基致力于改进“眼睛”的结构，以及其他发明、投影仪、新相机和灯具。普罗申斯基当时是世界公认的发明家，但他梦想为波兰工作。他希望电影业在他的祖国蓬勃发展。由于缺乏资金以及经济和政治形势使这些计划无法实施。他再也没有机会实施他的计划。不幸的是，他是家里唯一没有在战争中幸存的人。他被送到毛特豪森-古森集中营，从此再也没有回来。作为一个致力于工作的狂热发明家，在被驱逐出境期间，他随身携带了“眼睛”相机和他最新设计的草图。不幸的是，一切都丢失了。

## **Kazimierz Prószyński (1875 - 1945)**

**His inventions certainly deserved Oscars in their category. Nevertheless, years later, other stars came to the fore. A child who knew about the latest innovations from the realm of photography became a man who designed devices used by the entire film world. The development of cinematography would have been much slower without him.**

### **Lights, camera, action!**

Kazimierz Prószyński's grandfather had a photography workshop in Warsaw, where his grandson performed various experiments with childish curiosity. He used to show his family the pictures he had taken and even demonstrated magic tricks using lamps and mirrors. One day, as a child, Prószyński noticed an advertisement for live photography on the street. For a fee of 20 kopecks, a darkened room showed 24 images placed on a spinning wheel, creating the illusion of movement. This seemingly simple image of a horse jumping over an obstacle sank into his memory and inspired him to take up cinematography.

During his secondary school education, he began to show excellent technical skills, so in 1894 his parents decided to send him to study at the polytechnic in Belgium. They did not have to wait for the first results of his work. In the first year of his studies, he constructed a universal expeditor, a device for folding magazines, applying bands, and addressing. He thought of his father's needs and made it much easier for him to send subscribers the copies of "Gazeta Świąteczna" and "Promyk" he published.

However, Kazimierz was most fascinated by film. The existing cameras for projecting moving images had a fundamental flaw. The resulting image was not continuous and even. It was difficult to watch the projections of the jittery and flickering image. The screenings were often interrupted by equipment malfunctions. That had to be changed! He created a pleograph that did not have a faulty projector and was better than those used before. But this was only the beginning of a long series of Prószyński's inventions. Prószyński presented the first feature film with directed action using his improved device, the biopleograph. This improvement involved using two lenses and two tapes. The image was projected alternately during projection to eliminate gaps in the display caused by a moving tape. The first films that were watched in very high quality for the turn of the 19th and 20th century were: the Return of the Birbant - a movie about the adventures of a young man returning home after a drunken party, and The Adventure of the Horse-Drawn Carriage Driver, whose horses were buckled during a nap. And all these thanks to Kazimierz's inventions.

### **Columbus in Paris**

In 1908, Prószyński graduated from a polytechnic in Belgium. He had previously interrupted his studies to work on his inventions and moved to Paris. There, work on developing cinematography was in full swing because Paris - as a city full of theaters, cabarets, and artists - aspired to be "the city of film." Kazimierz continued to work on eliminating two of the most significant problems that still bothered him, namely, the flickering of light and image vibration

during film projections. His new solution involved using an obturator, i.e., an aperture with three slits so that the resultant flicker would be imperceptible.

The second problem was eliminated by improving the device that moved the film stock. The mechanism was difficult to invent but very simple to construct. Prószyński's improved pleograph was received with great enthusiasm by the film community. Its mass production began immediately, and it was gradually introduced to cinemas. This was a breakthrough for the entire cinematographic industry. Previously films had lasted no more than a dozen or so minutes due to eye strain. It was now possible to start developing plots into movies that could last up to several hours. Prószyński was called the Columbus of cinematography, and his work was recognized by Louis Lumiere, who gave him a priority in technical mastery. Today it may seem difficult to understand, but Prószyński's inventions caused a real revolution and were the driving force behind the nascent film industry.

### **"Eye" on the World**

Prószyński made the second breakthrough in cinematography by constructing an aeroscope, which is the first portable camera without a tripod, which stabilized the image with the help of a gyroscope placed in it. Kazimierz demonstrated his solution sitting in a saddle. He wanted to show that it was possible to get a satisfactory image even while riding a horse. Earlier cameras were huge and heavy and sensitive to shocks. This severely limited the producers' possibilities and directors' imagination. Thanks to Prószyński, live filming became possible, and the reporter's work took on a new meaning. The inventor himself recorded a report on the coronation of King George V in London in 1911. Cherry Kearton, an English traveler and wildlife explorer, became a huge advocate of the aeroscope after making many nature films in the African jungle. During World War I, the camera helped reporters document the war effort. Kazimierz's breakthrough invention was the cinephone, which couples the cinematograph with the phonograph, i.e., combines picture and soundtrack. Prószyński was ahead of even Thomas Alva Edison, who was working on the same device. Since his construction, films no longer had to be silent.

In 1914 Prószyński married Dorothy from England, with whom he had two children. The family settled in Warsaw. Over the following years, even after the war began in 1939, Prószyński worked on improving the design of "Oko" and other inventions, projectors, new cameras, and lamps. Prószyński enjoyed worldwide recognition and fame as an inventor, but his dream was to work for Poland. He wanted the cinematographic industry to flourish in our country. Lack of capital and the economic and political situation made it impossible to put these plans into practice. He never had a chance to realize them. Unfortunately, he was the only member of his family who did not survive the war and was sent to the Mauthausen-Gusen camp, from which he never returned. As an avid inventor dedicated to his work, he took the "Oko" camera and sketches of his latest designs when deported. Unfortunately, it is all gone.



斯特凡·巴拿赫 Stefan Banach (1892 – 1945)

他没有大学学历，博士论文也是意外之下答辩的，但他最后成为了教授。如果不是因为一个在克拉科夫普兰提公园发生的巧合，我们可能根本不会知道他的名字，他的一生似乎是由不可思议的机遇组成的。今日很多街道、广场和大学的演讲厅都以他的名字命名。而他也被称为波兰数学之父。

斯特凡·巴拿赫的人生开始得并不顺遂。他 1892 年三月 30 日出生于克拉科夫，在寄养家庭中长大，只见过亲生父亲。虽然童年过得相当辛苦，在学校的时候，巴拿赫展现了他出众的数学和语言长才，在高考前就已经开始给人上家教。高考以后，他开始在书店工作，但只要有时间就会钻研数学。他也同时在利沃夫理工学院读土木工程，但后来他只在那里学习了两年。但如果不是因为一个巧合，我们今日大概不会听说这么一号人物。1916 年的某一天，年轻学者胡果·斯廷豪斯(Hugo Steinhaus)正在克拉科夫的普兰提公园散步。他听到两个路人提到了“勒贝格积分”。这个词在当时是最新发现，只有研究该领域的专家才会知道，所以斯廷豪斯非常讶异。斯廷豪斯于是走向两位年轻人，与他们搭话。原来其中一位就是斯特凡·巴拿赫，另一位则是欧顿·尼科迪姆，一位数学系毕业的教师。他们对斯廷豪斯解释，他们常跟另一名大学生维尔托德·维尔柯实(Witold Wilkosz)碰面，一起讨论数学问题当作消遣。

意料之外的博士学位

很少有机会在路上遇到讨论数学界新发现的年轻人，所以斯廷豪斯对新认识的朋友们很感兴趣。他把自己当时正在研究的问题告诉了他们，而令他不敢相信的是，经过几句讨论后，巴拿赫居然给出了这个问题的解法！他们很快就在学术期刊《克拉科夫学院学报》里发表了共同的论文。这个机缘开启了巴拿赫多年且成果丰硕的学术之路。斯廷豪斯多年以后也说，他这辈子最大的发现... 就是发现了巴拿赫！

1917 年巴拿赫搬到了利沃夫，去听斯廷豪斯通过特许任教资格考后的讲座。三年后他被利沃夫理工学院的教授安東尼·沃姆尼斯基提名为教授助理。但因为巴拿赫并没有大学学历，让他成为教授助理是极不符合规定的，巴拿赫要成为教授助理的条件是，他必须在一年内写完博士论文。但他自己对这件事却不怎么上心，于是朋友们拜托他的助理帮忙他，他们每天亦步亦趋跟在他身边，写下他所有的证明、理论和想法。半年内，透过这个方法完成了一篇杰出的文章，但是巴拿赫自己却非常坚持不参加答辩。他们只好用骗的。

有一天，其中一位同事请巴拿赫到秘书室来一趟，他告诉巴拿赫，会有几位从华沙来的客人想和他讨论一些有趣的问题。巴拿赫对有趣的讨论十分憧憬，所以热切地答应来和这几位对他目前研究充满兴趣的客人们聊聊。在和他们聊完以后，那群人居然突然宣布：“博士论文答辩通过！”你们可以想象他那时有多惊讶。

1922 年，斯特凡·巴拿赫通过了特许任教资格考试，而当时他才 30 岁！几年后他就成为了教授。对这么年轻的学者来说，这样的成就相当难得。但这并不奇怪，巴拿赫除了给学生上课以外，很早就开始做学术研究了。他成为了一个新数学领域的创始者。这个领域叫“泛函分析”。斯廷豪斯和巴拿赫身边开始围绕着年轻有才的数学家，他

们组成了利沃夫数学学派，当时波兰的学术成就得到了世界的认可。20年代战间期对波兰来说并不容易，而波兰虽然没有数学研究的传统，还是在此时崛起，成为数学领域的领头羊，着实令人赞叹。巴拿赫在这段时间写了约60篇论文，除此之外，还写了不少书籍与教科书。他最有名的著作之一是《线性操作理论》，他因为这本书在数学界一炮而红。他定义了像是“巴拿赫空间”，这个世界上每个数学家都知道的理论。

### 献血喂虱子

第二次世界大战爆发的时候，巴拿赫是利沃夫大学数学与物理系的系主任。在纳粹占领时期，大学被关闭，而大学教职员因为属于波兰的精英阶级，随时处于危险之中，可能被逮捕、送到集中营，甚至被处死。鲁道夫·魏格尔教授及时赶来相助（有关鲁道夫·魏格尔，请看第...页），他当时正在研究世界上第一剂流行性斑疹伤寒疫苗。纳粹德国，特别是军队，因为非常需要这个疫苗，所以给了魏格尔教授较多的自由。魏格尔教授可以聘请工作人员来...献出鲜血喂养虱子。其中一位工作人员就是巴拿赫。献血的工作并不花时间，所以他还是可以做研究。在魏格尔教授研究室的工作有一部分也是为地下活动和秘密教学做掩护。

数学家们试图在战争的情况下过正常生活。其中特别有名的是他们在“苏格兰”咖啡馆的聚会。他们会讨论各种数学问题，还经常用铅笔在桌上或是餐巾纸上写下他们的解法。后来因为巴拿赫把自己的笔记弄丢了好几次，他的妻子乌琪亚给他买了一本专门用来写各种数学问题的笔记本。这本笔记本被放在咖啡馆里，所有咖啡馆的来客都可以随时写下他们的解法，成功算出答案的有时还有奖赏，比方说一只鹅。有些谜题到今日还没有被解开，到现在都还可以尝试。

但奇怪的是，巴拿赫在任何情况下都可以专注思考，咖啡馆的嘈杂声和音乐对他来说毫无影响。他特别喜欢跟人们在一起，也喜欢热烈的讨论。他的许多论文都是在跟学生的辩论中产生的。还必须说的是，他也是私人舞会的常客，学生们不只一次看到他早上八点穿着全套晚礼服来上课。一开始他们以为他当天可能要参加重要的晚会，但后来他们很快就发现，巴拿赫来上课前是在私人舞会上跳舞。巴拿赫活着见到了战争的结束。但后来他生了重病，1945年死于肺癌。

## **Stefan Banach (1892 - 1945)**

**He did not finish his studies, received his Ph.D. by accident, but became a professor. We would probably never have heard about him if it had not been for an accident in the Planty park in Krakow. His whole life seems to be a tangle of amazing coincidences. Today streets, squares, and university halls bear his name. He is called the father of the Polish school of mathematics.**

Stefan Banach had a tough start. He was born in Krakow on March 30, 1892, and raised in a foster family. He only met his father. Life was certainly not easy for him, but he showed exceptional mathematical and linguistic abilities at school. Even before passing his matriculation exam, he was giving private lessons. After passing the exam, he worked in a bookshop, but he devoted every free moment to mathematics. He also started to study at the Lwow Polytechnic, at the Faculty of Civil Engineering. He continued his education there for two years only. Probably we would never have heard about Stefan Banach if it was not for a coincidence. One day in 1916, a young scientist Hugo Steinhaus was walking in the park in Krakow when he heard two men saying, "Lebesgue's integral." He was stunned by this fact because this term was a novelty, known only to specialists. Steinhaus approached the young men. One of them was Stefan Banach, and the other was Otto Nikodym, a graduate student in mathematics and a teacher. The men explained to Steinhaus that they often met together with another student, Witold Wilkosz, to discuss mathematics for pleasure.

### **Surprise Doctorate**

It is not often in public places that you find young people discussing news from the world of mathematics. Steinhaus, curious about his new acquaintances, told the students about an interesting scientific problem he was working on at the time. How surprised he was when, after a few days, he received a ready solution from Banach! They soon published it as a joint paper in the Bulletin of the Cracow Academy. This unanticipated event became the beginning of a long and fruitful scientific relationship. Many years later, Steinhaus said that his most significant discovery in life was... the discovery of Banach!

In 1917, Banach traveled to Lviv to attend Steinhaus' habilitation lecture. Three years later, he was appointed an assistant at the Lviv Polytechnic by Professor Antoni Łomnicki. The university regulations were very strictly bent, as Banach had not finished his studies! The condition was that Stefan submitted his doctoral thesis within a year. However, he did not want to spend any time preparing the dissertation. His friends encouraged Banach's assistants to follow him step by step and write down all his thoughts, theories, and ideas. It took them six months to collect material for a substantial publication. Still, the author steadfastly refused to appear before the committee. They had to use a stratagem.

One day one of the employees asked Stefan to come to the secretary's office. There were a couple of gentlemen from Warsaw waiting there who had an interesting problem to solve. Attracted by the prospect of an exciting discussion, Banach eagerly agreed to talk to the newcomers, who were very curious about his current work. Imagine his surprise when the gentlemen announced a positive result of his doctoral defense after the conversation!

In 1922 Stefan Banach defended his habilitation thesis. He was 30 years old then! After another few years, he became a professor. That is an awe-inspiring career for such a young scientist. There was nothing strange about it. Banach, in addition to giving lectures, very quickly took up scientific and research work. He became one of the founders of a new mathematical field called functional analysis. Young, talented mathematicians gathered around Steinhaus and Banach, who created the Lviv School of Mathematics. The Poles gained worldwide recognition at that time. It is a phenomenon that during the interwar period, in a challenging time for Poland, Banach's homeland grew to become a mathematical power; although, it did not have such traditions before. Banach created almost 60 scientific papers in that period, but he also wrote many books and textbooks. One of the most famous is *The Theory of Linear Operations*. The Pole became very recognizable in the world of mathematicians. His concepts, such as "Banach space," are known today to every mathematician in the world.

### **The Lice Feeder**

When the war broke out, Stefan Banach found himself at the University of Lviv as dean of the Faculty of Mathematics and Physics. Under the German occupation, the universities were closed. The academic staff, who comprised Polish intelligentsia, was exposed to the danger of arrest, deportation to camps, or even death. Professor Rudolf Weigl (you can read about him in this book) came to help his colleagues. At that time, he was working on the world's first vaccine against spotted fever. The Germans gave him more freedom of action because of the high demand for the vaccine, also among German soldiers. Weigl could therefore employ workers as... lice feeders. Banach was one of them. The activity itself was not time-consuming, so Stefan Banach could conduct scientific work. The work at the Weigl Institute was partly a cover for his underground activities and secret scientific courses.

Despite the war, the mathematicians tried to maintain normality. Their meetings in the Scottish café became famous. They would discuss various issues, often writing the solutions in pencil directly on the tables or napkins. After they lost their notes several times, Banach's wife, Łucja, bought a special notebook in which they noted riddles or solutions. The book was in the café, and visitors could write down answers at any time. Sometimes they received a reward, for example, as a live goose. Specific issues remain unsolved today and are waiting to be deciphered.

Strange as it may seem, Banach was utterly undisturbed by the café noise and loud music. He was able to concentrate his thoughts in any circumstances. Moreover, Banach enjoyed the company of people and lively discussions - many of his works resulted from disputes with students. He was also a frequent guest at private balls. Sometimes students saw Banach giving a lecture in a tailcoat at eight in the morning. At first, they suspected that he had some important lectures that day, but they soon realized that Banach's way to work led straight from the last dance at the balls. Stefan Banach lived to see the end of the war, but he became very ill and died of lung cancer in 1945.



## 鲁道夫·魏格尔 Rudolf Weigle (1883 – 1957)

以这个人的传记为蓝本，可以拍一部轰动一时的电影。这部电影里有战争、感动、数百万被拯救的生命，但也会有背叛、国际丑闻和.....不幸的是，没有幸福的结局。鲁道夫·魏格尔于 1920 年研制出了斑疹伤寒疫苗。他在专业上取得了惊人的成功，享誉整个医学界。但历史对他残酷无情。

鲁道夫·魏格尔 1883 年出生于今天的捷克共和国普热罗夫市。母亲是捷克人，父亲是奥地利人。他几岁时才开始学习波兰语。他在童年失去了父亲，他的母亲后来改嫁给了波兰人。鲁道夫在波兰文化中长大，对波兰传统认同的程度非常工，以至于他公开声称自己是波兰人。

### 成功

他在利沃夫大学读生物科学，30 岁时他通过了动物学和解剖学特许任教资格答辩。第一次世界大战爆发之后，魏格尔被征召到奥匈帝国军队，在那里开始研究斑疹伤寒。在那个年代，战场上死于疾病的士兵比死于战伤的士兵还多。斑疹伤寒造成了致命的损失，因为此病在卫生条件恶劣和食物困难的地方尤其危险。战俘和战壕中的士兵死于斑疹伤寒。情况十分严重。在第一次世界大战期间，这种疾病导致了近 300 万人死亡。1915 年的斑疹伤寒疫情，使奥匈军队损失惨重，无人可战，一些地区的敌对行动甚至暂停了几个月。

第一次世界大战之后，时任教授职位的鲁道夫·魏格尔在独立的波兰城市 - 利沃夫 - 成立了斑疹伤寒病毒研究所。经过两年紧张的工作，他研发出了斑疹伤寒疫苗。世界上第一剂！他用了虱子研制疫苗，并用...自己的血喂养。他把一个装有虱子的盒子系在他的前臂上。虱子是一种以人类血液为食的昆虫。一段时间后，喂食的虱子被感染了传播斑疹伤寒的细菌。由受感染的虱子生物材料制成疫苗。制成过程非常繁琐。数据显示，1933 年，魏格尔研究所每天孵化出大约五千只虱子。它们被关在笼子里，用人血喂养。每天有 5000 只被感染斑疹伤寒的虱子，然后在显微镜下将受感染的虱子作为生物材料制成疫苗。准备一剂需要 120 只虱子。鲁道夫·魏格尔早在 1920 年就已经开发出一种疫苗，但为了确保其绝对正确的作用，他在接下来的 10 年中对其进行了测试。科学界以及政界人士都推动他发表研究成果。一战后恢复独立的波兰还十分贫困，斑疹伤寒不仅杀死了病人，也杀死了医生。如果魏格尔早点发表他的研究成果，他绝对能获得诺贝尔奖。连续数年，诺贝尔委员会把奖项授予了其它领域的科学家。也许他们以为鲁道夫·魏格尔以后还有机会获奖。斑疹伤寒疫苗的发明者配得上科学界的最高奖项这一事实是毋庸置疑的。在被第一次世界大战摧毁的欧洲，魏格尔的疫苗拯救了数十万人。

### 战争

不幸的是，1939 年第二次世界大战爆发了。德国人进入利沃夫时鲁道夫·魏格尔在那里正在进行着他的研究，他们想在柏林为这位学家提供研究所，并授予他荣誉。但他拒绝了因为他自觉是波兰人。虽然当时德军杀了波兰教授和他们的家人，但魏格尔没有受伤，因

为战争一线他的疫苗。他在为自己的研究所招聘工作人员方面获得了充分的自由。就这样，他挽救了数千人的生命，包括波兰诗人齐别根纽·赫伯特（Zbigniew Herbert）以及杰出的数学家斯特凡·巴拿赫（Stefan Banach）。利沃夫的所有的知识分子、文化和科学界的人以及几乎整个利沃夫波兰救国军的指挥部都经过了魏格尔研究所。他们都被称为虱子的饲养者。他们将装有虱子的盒子绑在身上，让虱子吸食他们的血液。在虱子的饲养者当中也有魏格尔本人和他的妻子。在德军占领的利沃夫，虱子的饲养者的职位拥有了不被逮捕的特权和安全。魏格尔的疫苗也被走私到奥斯威辛-比克瑙集中营、利沃夫和华沙隔离区，以及游击队。

当苏联红军占领利沃夫时，苏联领导人尼基塔·赫鲁晓夫本人向鲁道夫·魏格尔提议在莫斯科建立一个独立的研究所。但魏格尔又谢绝了，因为…他自觉是波兰人。战争结束后，利沃夫不属于波兰，鲁道夫和他的家人不得不离开这座城市。首先，他搬到克拉科夫，在那里他可以在雅盖隆大学进行研究。一直有人怀疑他在战争期间与德国人合作过。尽管他享有国际声誉，但共产党当局就是不放过他。科学界也孤立了他。1948年瑞典科学院提名魏格尔教授获得诺贝尔奖时，共产党当局阻止了这一提名。鲁道夫·魏格尔两次获得诺贝尔奖提名，但一次被德国人阻止因为他没有配合，而另一次被波兰人阻止，因为…他们认为他跟德国人合作过。教授很快从不友好的克拉科夫搬到波兹南。于1957年突然逝世。

如果鲁道夫·魏格尔教授的故事发生在美国，它肯定会被多次拍摄并以漫画版本记录下来。鲁道夫非常勤奋、聪明和敏锐。他的生活与另一位波兰科学家扬·柴克拉斯基的生活非常相似。由于他在战争期间拯救了犹太人的生命，死后被以色列授予“国际义人”称号。在欧洲，最后一例斑疹伤寒发生于20世纪60年代。

## **Rudolf Weigl (1883 - 1957)**

**This man's life story could make for a thriller. It would show war, emotions, millions of lives saved, betrayal, international scandal, and, unfortunately, no happy ending. Rudolf Weigl developed a vaccine against spotted fever in 1920. He achieved spectacular professional success and was a man known in the whole medical world. But history dealt with him cruelly.**

Rudolf Weigl was born in 1883 in Prerov, which is now in the Czech Republic. His mother was Czech, and his father was Austrian. He did not learn Polish until he was a few years old. He lost his father as a child, and his mother remarried to a Pole. Rudolf was raised in the Polish tradition and identified with it so much that he publicly claimed to be Polish.

### **Success**

He studied natural sciences in Lviv. At the age of 30, he received his habilitation in zoology and anatomy. When World War I broke out, Weigl was drafted into the Austro-Hungarian army. He began research on spotted fever. In those days, more soldiers died on battlefields from diseases than from battle wounds. Typhus was particularly deadly. It spread in places where hygiene and good nutrition were almost non-existent, so it took its toll among the prisoners of war and soldiers in the trenches. The disease killed three million people during World War I. The typhus epidemic of 1915 wreaked havoc on the ranks of the Austro-Hungarian army. In some areas, there were no soldiers who would fight, so the hostilities were halted for several months.

After World War I, Rudolf Weigl, already a professor, founded the Institute of Typhus and Virus Research in Lviv. It was a city that lay within the territory of independent Poland. After two years of intensive research, his vaccine against typhus was ready. It was the first in the world! To develop it, he used lice, which he fed with... his blood. Lice are insects that feed on human blood. To provide them with food, Weigl attached a box full of lice to his forearm. After some time, he infected them with bacteria carrying typhus. Then, he would use a microscope to derive the biological material from each louse and use it to make a vaccine. The process was very tedious. Records show that in 1933 approximately five thousand lice were hatched each day at the Weigl Institute, and another five thousand were infected with typhus. One needed 120 lice to produce one vaccine.

Rudolf Weigl developed the vaccine as early as 1920. Still, to be sure that it works properly, he tested it for the next ten years. He was pressured to publish the research results by the scientific community and by politicians. In Poland, reborn after World War I, the poverty was devastating, and typhus epidemics killed both the sick and doctors. If Weigl had published the results of his research earlier, he would undoubtedly have been awarded the Nobel Prize. The Nobel Committee rewarded scientists from other fields for the next few years, perhaps assuming that Rudolf Weigl could be recognized later. There was no doubt that the creator of a typhus vaccine deserved the highest award in the world of science. In ruined by World War I Europe, il's vaccine had already saved hundreds of thousands of people.

## War

Unfortunately, in 1939 the Second World War broke out. When the Germans entered Lviv, where Rudolf Weigl conducted his research, they offered him honors and a new institute in Berlin. He refused because he considered himself a Pole. Although the Germans killed Polish professors and their families in those days, they did not harm Weigl - they needed his vaccine at the front. Among other things, the professor fought for total freedom in hiring personnel for his institute. As a result, he saved the lives of several thousand people, including the poet Zbigniew Herbert and the brilliant mathematician Stefan Banach. The entire intelligentsia of Lviv, people of culture, science, and almost the whole command of the Lviv Home Army passed through Weigl's institute. They were all so-called "lice feeders." They attached boxes of lice to their bodies and fed them with their blood. Weigl himself and his wife were among the lice feeders, as well. The position of lice feeder guaranteed inviolability and safety in German-occupied Lviv. Weigl's vaccines were also illegally smuggled to the Auschwitz-Birkenau camp, the ghettos of Lviv, Warsaw, and distributed among the underground army.

When the Soviet Red Army captured Lviv, Nikita Khrushchev, the leader of the Soviet Union, offered Rudolf Weigl an independent Institute in Moscow. Weigl refused again because he felt Polish. After the war, however, Lviv no longer belonged to the Polish state, and Rudolf and his family had to leave the city. First, he settled in Cracow, where he could conduct his research at the Jagiellonian University. However, he was suspected of collaborating with the Germans during the war. The communist authorities, despite his international fame, fought him. The scientific community also isolated him. When in 1948 the Swedish Academy of Sciences nominated Professor Weigl for the Nobel Prize, the Communist authorities blocked his nomination. Rudolf Weigl was twice close to receiving the most excellent award in the world of science. Once Germans stopped it because he did not want to work for them, and once by Poles because they believed he worked for Germans. The professor quickly moved from the hostile Cracow to Poznań. He died suddenly in 1957.

If the story of Professor Rudolf Weigl had happened, for example, in the USA, it would undoubtedly have been filmed many times and presented in a comic book. Rudolf was very hard-working, intelligent, and wise. His life is very similar to the life of another Polish scientist, Jan Czochralski. Rudolf Weigl was posthumously awarded the Righteous Among the Nations medal for saving Jews during the war. In Europe, the last case of spotted fever was reported in the 1960s.



扬·塞切帕尼克 JAN SZCZEPANIK (1872 – 1926)

他是一位杰出的、多才多艺的建造师。有时候他被比作像爱迪生一样伟大的发明家，甚至被誉为来自加利西亚的达芬奇。他发明并制造的机器多年之后才获得世界的赏识。有趣的是他没有局限于一个领域。其实，扬·塞切帕尼克所有的发明具有一个共同点。它们都是彩色的。扬·塞切帕尼克这个人对颜色很着迷。

他于 1872 年出生在奥地利分区，现在属于乌克兰的鲁德尼基村。小时候，他参观了另一位出色的波兰探险家伊格纳茨·卢卡谢维奇的工作室后，（您可以在第... 页阅读有关他的信息）。发现自己对技术和科学如此着迷，以至于他决定成为一名教师。在许多来源中提到的信息说他非常规地讲课。他进行了许多实验，甚至今日这也不平凡，在他那个年代更是非常罕见的。据说他总是随身带着一本笔记本，便于记录自己的想法。而他的想法源源不断涌现。他的第一个重大发明，或者说是一项改进，是自动编织系统。作为一名老师，他在许多学生的乡间住宅里看到了织布机，但他发明和建造的东西将编织提升到一个全新的水平。塞切帕尼克极大地改进了织机，使用多孔卡片可以在短短几个小时内编织出带有彩色图案的挂毯。这样的机械系统发明之前整个过程需要几天，有时甚至几周时间。

>> 发端

自动织机给塞切帕尼克带来了名气与财富。这项技术是如此之好，连奥匈帝国皇帝本人都很欣赏他的挂毯，甚至免除了杨的兵役，作为对他的奖励。

25 岁时，扬·塞切帕尼克首先在英国，然后在美国，获得了电传照相机专利，作为彩色电视机的原型。该机器是一种远距离传输彩色图像和声音的装置。在 19 世纪末还没人想到电视。在维也纳介绍电传照相机时引起了全世界的轰动，使杨成为了世界名人。他的知名度不限于欧洲，在大西洋外也广为人知。当时《汤姆索亚历险记》的作者，美国著名作家马克·吐温来到欧洲时，他还去了维也纳与扬塞切帕尼克会面。

照片雕刻机-用于雕刻或复制对象的三维模型的设备是个杰作。通过镜子的组合，它将原始物体的轮廓投影到艺术家工作的材料上。因此有一个模型和一个图案就足以轻松地制作它的 3D 副本。

塞切帕尼克的织布厂制造了第一件防弹背心的面料，尽管背心本身是由另一个波兰人发明的，即卡齐米日·埃格伦（有关齐米日·埃格伦，请看第... 页）。由于他们两位有矛盾，尽管防弹背心绝对是由生活在美国的埃格伦发明，但是在欧洲塞切帕尼克把他的发明归为己有。西班牙国王马车的墙壁上覆盖着防弹布料，在轰炸中挽救了国王的生命，扬被授予皇家勋章。俄罗斯沙皇也想奖励塞切帕尼克的同一发明，即防弹背心，但发明家出于政治原因谢绝了。波兰的一部分当时被俄罗斯占领，塞切帕尼克认为接受沙皇勋章是不明智的。最后沙皇还是送给他一块镶嵌钻石的金表。

>>> 痴迷

“防弹背心业务”的良好发展使塞切帕尼克赚的盆满钵满，而且用赚来的钱制造出... 世界上第一支电动机枪。但真正的发明出现在一年后。无线电报。在此期间，至少有几个人设法制造了一种使用电磁波进行通信的设备，最后，孜孜不倦的意大利人马可尼，因对无线电报的研制和改进而获得诺贝尔物理学奖。

塞切帕尼克最大的成就是在彩色摄影以及有声和彩色电影领域里。他建造了三种彩色摄影、彩色胶卷的照相机和电影放映机。他也发现一种在电影上录制声音的方法。虽然无声电影钢琴伴奏者因此丢了饭碗，但是当电影中的角色与观众交谈并听到他的声音时，观众获得了一种全新的体验。他的电影实验引起了轰动，有时甚至是震惊。字面上的震惊。1925 年塞切帕尼克拍摄了一部关于外科手术的电影。这是一部彩色电影，准确的色彩使电影画面如此逼真，据说有些观众在观影中还因不适晕倒了。此外，他们对观看高山拍摄的电影赞不绝口。媒体报道，这些电影中的色彩非常逼真，观看体验简直太棒了。

他所做的一切都必须完美的。在这方面他不接受任何妥协。不过彩色的胶卷及特殊的摄像机相当复杂，因此价格昂贵。在与特艺七彩的竞争中逐渐败下阵来。今日众所周知，由塞切帕尼克发明的显色或再现系统更完美，它给出了更好的结果，但特艺七彩的成本更低。他的其它发明大多是出于好奇心，没有大获成功，因为它们太超前了。在塞切帕尼克发明 35mm 彩色胶片 30 年后柯达和爱克发才开始使用。塞切帕尼克晚年没有钱申请专利权。因此他的发明在英国、法国和美国被别人完全免费使用。他总共在全球 5 个国家获得了 92 项专利。他于 1926 年逝世，他死后发现的笔记表明他也对潜艇、飞艇和带有移动机翼的飞机感兴趣。不幸的是，德国人在占领期间摧毁了他所有的设备和他的许多技术笔记。保存下来的东西在华沙起义期间被烧毁了。

## **Jan Szczepanik (1872 - 1926)**

**He was a brilliant and versatile constructor. He is sometimes compared to the most eminent inventors, such as Edison, and even called Leonardo da Vinci from Galicia. He invented and built devices that the world did not appreciate until many years later. Interestingly, he did not focus on one field. However, all of Szczepanik's inventions had one thing in common. They were colorful. This man was fascinated by colors.**

He was born in 1872 in the village of Rudniki, which belonged to the Austrian partition, now part of Ukraine. As a child, he visited the workshop of Ignacy Łukasiewicz, another brilliant Polish discoverer, about whom you can read on our website. Technology and science fascinated him so much that he decided to become a teacher. Many sources claim that his lessons were very unconventional. He did a lot of experiments, which even today is not standard, but in those days, it was a real rarity. He always carried a notebook to write down his ideas. And he had a lot of them. His first significant invention, actually an improvement, was an automatic weaving system. As a teacher, he had seen looms in many rural homes of his students, but what he invented and constructed took weaving to another level. Szczepanik improved the weaving machine so much that, thanks to perforated cards, it was possible to weave a tapestry with a colored pattern in just a few hours. Before the invention of the system, it took several days and sometimes even several weeks.

### **Beginnings**

The automatic weaving machine brought Szczepanik fame and big money. The technology was so good that the Emperor of Austria-Hungary himself admired his tapestries. He released Jan from military service as a reward for his achievements.

At the age of 25, Jan Szczepanik, first in Great Britain and then in the USA, patented the *telectroscope*, the prototype of the color television. This device transmitted color images and sound over a distance. At that time, at the very end of the 19th century, no one had yet thought of television. When the telectroscope's possibilities were presented in Vienna, they caused a worldwide sensation. It turned Jan into a celebrity not only in Europe but also overseas. When the famous American writer Mark Twain, author of *The Adventures of Tom Sawyer*, came to Europe, he went to Vienna to meet Jan Szczepanik.

The Fotosculptor, a device for sculpting or copying a three-dimensional model of some object, was a masterpiece. A combination of mirrors projected the contours of the original object onto the material on which the artist worked. As a result, it was enough to have a model and pattern to make its three-dimensional copy.

Szczepanik's weaving workshop produced the material used to make the first bulletproof vests, although it was Kazimierz Żegleń (you can read about him in this book) who invented the vest itself. The men had a dispute about it. Although it was Żegleń living in the USA who invented the bulletproof vest, it was Szczepanik who claimed its authorship in Europe. Jan received a royal medal after the walls of a Spanish king's carriage covered with bulletproof material saved the monarch's life during a bombing. The Tsar of Russia wanted to award Szczepanik his medal for the same invention - a bulletproof vest. Yet, the inventor refused to accept it for political reasons. At that time, part of Poland was under Russian annexation. Szczepanik considered the Tsar's recognition a blunder. Therefore, the Tsar sent him a gold watch with a diamond-studded case.

## Obsession

"Vest business" developed quite well. Thanks to this, Szczepanik earned money to create the world's first electric machine gun. However, the real revelation came the following year - the wireless telegraph. At that time, at least several people built a device that used electromagnetic waves for communication. Among the most entrepreneurial ones was Marconi, who received the Nobel Prize in Physics for developing wireless telegraphy.

Szczepanik's most significant achievements were in the field of color photography and sound and color film. He constructed three models of film cameras and projectors for color photography and a camera and a projector for color photography. He also found a way to record sound on film. On the one hand, tapers lost their jobs. On the one hand, viewers were able to experience a whole new sensation when a character in the movie spoke to them, and they heard his voice. His cinematic experiments caused a sensation and sometimes even shock. Literally. In 1925, Szczepanik made a film of a surgical operation. It was a color film, and the accurate rendering of the colors made the image so realistic that some in the audience reportedly fainted. At other times, they delighted in watching a film shot on alpine passes. The press said that the colors in these films were so realistic that the viewing experience was incredible.

Everything he did had to be perfect. He did not compromise in this regard. However, color films and special cameras were quite complicated and therefore expensive. They lost the race with the color system entering the ocean - Technicolor. Today, we know that Szczepanik's rendering or reproducing colors systems were more accurate and gave much better results. However, Technicolor was cheaper. Other inventions remained mere curiosities and were not successful because they were too far ahead of their time. Kodak and Agfa used the method of small-image color film invented by Szczepanik only 30 years after its invention. Szczepanik, especially towards the end of his life, did not have the money to register patent rights. As a result, his inventions were used in Great Britain, France, or the USA utterly free of charge. In total, he registered as many as 92 patents in 5 countries of the world. He died in 1926. The notes found after his death indicated that he was also interested in submarines, airships, and airplanes with movable wings. Unfortunately, the Germans destroyed all the equipment and many of his technical notes during the occupation. What remained burnt during the Warsaw Uprising.



拿破仑·齐布爾斯基 Napoleon Cybulski (1854 – 1919)

有的人不喜欢因循守旧。有些人喜欢开拓荒野。这不仅适用于旅行者或新大陆的探险家，也适用于科学家。拿破仑·西布爾斯基是这类科学家之一。他对自己的定位是介于物理学和医学之间。他的研究领域囊括血液流速，大脑电波活动，保证正常心跳频率的脉搏，和激素。

据说他是一位极其谦虚勤奋的人，但他的同事说，当他制造的设备不起作用时，他会把它们扔在地上。他把愤怒发泄在物体上，因为他对人总是很善良，很友好。为了能够与最优秀的人合作，他对自己的要求也很高。他是近 80 部科学著作的作者，其中许多是开创性的。他一直在研究其他医生和物理学家都不感兴趣的话题。利用自己在物理学和力学方面的丰富知识来研究生物体，包括人体。当他制造测量动脉中血液流动速度的装置时，令人惊讶，因为之前别人认为这没有什么用处。从今天的角度来看，我们宁愿说这是不可或缺的。如果你不了解人体一大脑或内分泌系统工作的原理如何帮助人，如何治病？

他于 1854 年出生在维尔纽斯地区的克鲁克诺西（Krzywonosy）村，现在位于白俄罗斯。他被起名叫拿破仑，因为他父亲崇拜拿破仑·波拿巴。小时候他对爬行动物和两栖动物很感兴趣。据说，他小时候常把这些小动物带回家，在家庭成员中引起了不小的轰动。高中后，他开始在圣彼得堡的军事和医学院学习。在那里他认识了俄罗斯杰出生理学家伊万·巴甫洛夫，诺贝尔奖得主，发现“巴甫洛夫反射”的人。拿破仑·西布爾斯基 24 岁时撰写了第一篇科学论文，关于动物的血压及血流速度。今日众所周知所谓的心脏产生的脉搏可以以超过 50 公里/小时的速度在颈动脉中传输。当时没有人知晓如何测量这些数量。西布爾斯基设计并制造了血流计，即一种测量血管中血流速度的装置。

## 大脑

作为一个波兰人，一月起义失败之后，在俄罗斯分区的他不能指望一份好工作和机会来追求他对科学的激情。因此，在完成博士论文答辩后，他搬到克拉科夫并开始于雅盖隆大学工作。据说在那里他第一次听到了波兰语的科学讲座。拿破仑·西布爾斯基在克拉科夫创建了生理学、组织学和胚胎学系。据说，他工作的大楼状况非常糟糕，当一辆汽车从附近的街道上驶过时，地板颤抖得无法用显微镜进行研究。因此，这位科学家会在夜间交通停止时进行部分研究。所有这些不便并没有妨碍到他。西布爾斯基会组织一些付费科普讲座用赚来的钱贴补研究和办公室维修。

他非常善于交际，富有同情心。非常信任自己的学生，能让同事们更独立地工作。他乐于与其他科学家合作，并与他们分享他的科学思想。他很友好并很开放。虽然，偶尔会把研究设备扔在地上，但仅仅在出现问题的时候。

他做了心电图，试图了解心脏的工作原理。心脏的肌肉是如何以如此完美的频率收缩的？他还开始了催眠的生理基础的研究。当时科学和文化界对这个话题十分着迷。催眠师很受欢迎，人们相信通过催眠可以治愈许多疾病。不过拿破仑·西布爾斯基一直科学地对待这个课题。搬到克拉科夫几年后，与他的一名学生开始对大脑电波活动的开创性研究，具体对大脑皮层和脊髓的电现象的研究。1890 年他成为世界第一个测量

大脑电波活动的人。通过测量电流，赛布爾斯基和他的同事，定位了大脑皮层的感官区域。

压力

西布爾斯基对味觉也进行了研究 - 具体是味觉来源的基础。然后，他研究并基本上测量了骨骼肌产生的热量。要做到这一点，他必须建造一个特殊的装置，一个微型热量计。该仪器首次在罗马国际医生大会上亮相并引起轰动。虽然他撰写了近 80 篇科学著作，其中许多是开创性的，但他最大的科学成就是发现了一种应激激素——肾上腺素。

在一次常规研究中，西布爾斯基注意到肾脏上有两个肿块。他通过实验表明，切除这些肿块会影响整个生物体的功能。他表明这些肿块—被他称为肾上腺—分泌到血液中一种物质，导致神经和肌肉系统的功能发生了变化。他称这种物质为 *suprarenina*，后来称为肾上腺素，也就是一种在压力机制中起关键作用的激素。其释放到血液中会导致心脏跳动加快，增加血压并扩张瞳孔。肾上腺素还调节血糖水平，简而言之—为身体进入战斗状态或快速逃跑做好准备。当时西布爾斯基担任雅盖隆大学的教授兼校长，因发现肾上腺素而三次获得诺贝尔奖提名。有趣的是，当波兰重新获得独立时，学术学院授予西布爾斯基教授所谓的“波兰诺贝尔奖”的奖项。该奖的物质价值相当于 12 公斤黄金。以今日的汇率计算，将超过 200 万兹罗提，大约是诺贝尔奖价值的一半。无论如何，可观的财富。

西布爾斯基不仅是个科学家，也是个社会活动家。今天，我们要说的是，他一直游说以提高人们教育水平和健康意识。他本人很喜欢体力活动。他为女性获得受教育权利而奔走。他与细菌学家朋友 Kazimierz Bujwid 在克拉科夫开设了第一所女子中学。拿破仑·西布爾斯基于 1919 年在大学的办公室里死于中风。

## **Napoleon Cybulski (1854 - 1919)**

**Some people don't like to follow the beaten path. Some people love to wander. And this does not only apply to travelers or explorers of new lands but also scientists. One of them was Napoleon Cybulski. He believed that his place was somewhere between physics and medicine. He was fascinated by the speed of blood flow, the brain's electrical activity, the impulses that make the heart contract in the proper sequence, and hormones.**

He was said to be an extremely humble and hard-working man. His co-workers claimed that he would throw on the floor the devices he built which did not work. He vented his anger on objects, yet he was helpful and friendly towards people. To cooperate with the best, he also demanded a lot from himself. He was the author of nearly 80 scientific papers, many of them ground-breaking. The topics he researched were interesting neither for physicians nor for physicists. He used his vast knowledge of physics and mechanics to study living organisms, including man. For example, when Cybulski built devices to measure the speed of blood flowing in the arteries, people were surprised because they thought it was of little use. From today's perspective, we would definitely consider it essential. How can you help people and cure them if you don't understand how human bodies work - the brain and the endocrine system?

He was born in 1854 in the village of Krzywonosy in the Vilnius region, now the territory of Belarus. He received the name Napoleon in honor of Napoleon Bonaparte, whom his father adored. In childhood, he was interested in reptiles and amphibians. He is said to have brought them home, which caused quite a commotion among his family members. After graduating from high school, he began studying at the Military and Medical Academy in St. Petersburg. He met an outstanding Russian physiologist, Ivan Pavlov, a Nobel Prize winner responsible for "Pavlov's reflex." He wrote his first scientific paper at the age of 24. It addressed the issue of blood pressure and velocity in animals. Today, we know that the so-called pulse wave produced by the heart can move in the carotid artery at speeds exceeding 50 km/h. At that time, however, it was not known how to measure such quantities. Cybulski designed and built a photochemotachometer, a device measuring the speed of blood flow in blood vessels.

### **Brain**

As a Pole living in the Russian partition, after the fall of the January Uprising, he could not count on a good job and the possibility to continue his scientific passions. Therefore, after defending his doctoral dissertation, he moved to Cracow and took up a job at the Jagiellonian University. It is said that it was there that he heard a scientific lecture in Polish for the first time in his life. Napoleon Cybulski created the Department of Physiology, Histology, and Embryology in Kraków. The building where he worked was reportedly in such poor condition that when a car drove along the nearby street, the floor trembled so much that researching with a microscope became impossible. Therefore, the scientist conducted part of his research at night, when the traffic stopped. All these inconveniences did not discourage Cybulski. He earned money for his research and renovations by organizing, among other things, paid popular science lectures.

Cybulski was a very sociable, open, and friendly person. He trusted his students and allowed his co-workers a great deal of independence. He willingly cooperated with other scientists and shared his scientific ideas with them. Well, he only occasionally threw research equipment on the floor, but only when something didn't work out for him.

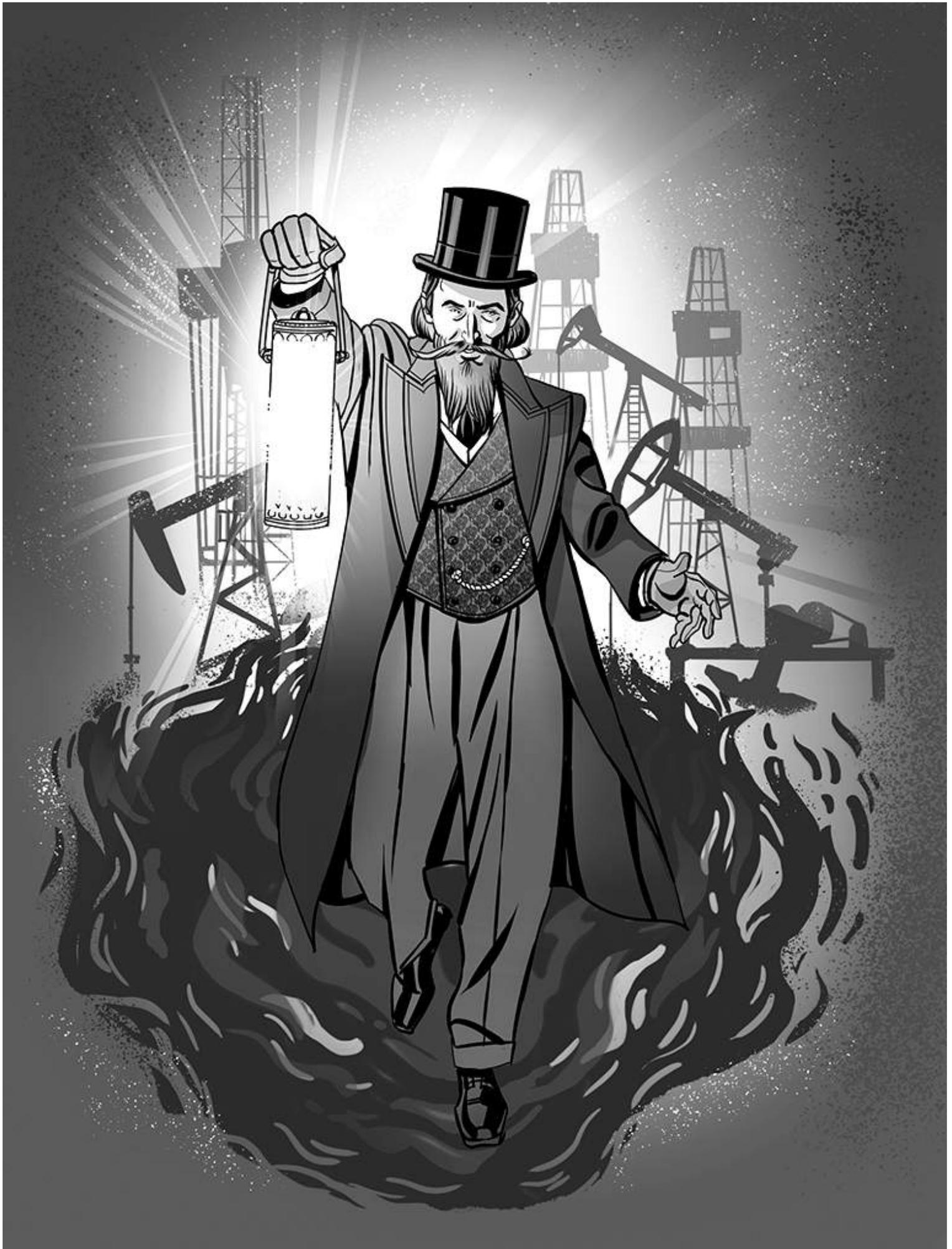
Cybulski was doing electrocardiography to understand how the heart works and how its muscles contract in such perfect order. He also initiated research into the physiological basis of hypnotism. These were the times when the world of science and culture was fascinated by this subject. Hypnotists were very popular, and people believed that hypnosis could cure many diseases. Napoleon Cybulski, however, took a scientific approach to the matter. A few years after moving to Krakow, he and one of his students began groundbreaking research on the brain's electrical activity, specifically on electrical phenomena in the cerebral cortex and spinal cord. In 1890, he became the first person in the world to measure the brain's electrical activity. With the help of his colleagues, Cybulski located the sensory areas of the cerebral cortex by measuring the currents.

## **Stress**

Cybulski was also interested in taste - specifically, why we experience certain sensations. He then studied or measured the amount of heat produced by skeletal muscles. To do this, he had to construct a unique device, a microcalorimeter. This device was first presented at an international congress of physicians in Rome and created a sensation. Although he authored nearly 80 scientific papers, many of which were ground-breaking, his most significant scientific achievement was the discovery of the stress hormone - or adrenaline.

During one routine examination, Cybulski noticed two lumps located above the kidneys. Experimentally, he showed that cutting out these lumps affected the function of the entire body. He proved that the adrenal glands - as he called these lumps - secrete into the blood a substance that alters the action of the nervous and muscular systems. He called this substance suprarenin. It produces adrenaline, a hormone that plays a vital role in the mechanism of stress. Its release into the blood causes faster heartbeat, higher blood pressure, and dilated pupils. Adrenaline also regulates blood sugar levels; in short, it prepares the body to fight or flee quickly. For its discovery, Cybulski, already then a professor and rector of the Jagiellonian University, was nominated three times for the Nobel Prize. Interestingly, when Poland regained its independence, Professor Cybulski was awarded the Academy of Arts and Sciences prize called the "Polish Nobel." The material value of this award was equivalent to 12 kilograms of gold. Considering today's exchange rate, it would be more than 2 million PLN or about half the value of the Nobel Prize. Either way, a fortune.

Cybulski was not only a scientist but also a social activist. Today we would say that he lobbied for the improvement of education and health awareness. He fought for women to be able to study. Together with his friend, bacteriologist Kazimierz Bujwid, he opened the first female gymnasium in Kraków. Napoleon Cybulski died in 1919, in his office at the university, as a result of a stroke.



## 伊格纳齐·武卡谢维奇 Ignacy Łukasiewicz (1822-1882)

药剂师、石油专家和社会活动家。据说他这个人话不多，但很固执和勤劳。也许只因为这种性格当生意不顺利，炼油厂着火时，他并没有崩溃。同时，他是一位心地善良的人，非常注重家庭，受到教皇本人的赞赏，并授予他内务大臣的荣誉。他的行动热忱成为很多人的动力。他是石油工业的先驱。他被人们尊称为“武卡谢维奇教父”。

伊格纳齐·武卡谢维奇出生于一个贫穷的贵族家庭，在喀尔巴阡山省 Zaduszniki 村。他的家人居住的小宫殿里发生过 2 次火灾。尽管有这些不愉快的经历，武卡谢维奇的童年还是在亲切的气氛中度过的。

伊格纳齐 8 岁时，他们一家搬到了热舒夫。他们做出了这个决定是由于伊格纳齐父亲的病和他经常去看医生的必要性。在新的地方，年轻的武卡谢维奇通过了小学考试，并与他的兄弟方济各一起进入了热舒夫的高中。他在教会学校学习得很好，但由于家庭经济困难，只有一个兄弟可以继续读书。父亲逝世之前决定是方济各要上大学。伊格纳齐从高中毕业之后将要学习药剂师的专业。为什么为他选择这个特殊的职业？不太清楚。也许是因为家庭传统，也许是因为男孩的兴趣。

### 有秘密的药剂师助手

经过四年的实践，伊格纳齐通过了考试，之后成为了药剂师的助手。首先，为了通过考试他不仅要学习阅读处方和配方，还要学习药物化学和简单化合物的分析。这些知识，尤其是对实验室设备的熟悉，对他接下来的几年非常有用。年轻的伊格纳齐在药店工作时开始梦想读大学。没有大学学历他不能成为药剂师，并自己开店。他只能当药剂师的助手。与青年武卡谢维奇一起工作的人都记得他是一个沉默寡言和神秘的人，但同时是一个非常勤奋的人。在别人的印象当中他是一位心地善良、乐于助人、依恋家人和朋友的人。

当他担任药剂师助理时，伊格纳齐就开始涉足政治。波兰当时处于分裂状态，年轻的武卡谢维奇和其他许多人一样，想要改变这种状况。于是伊格纳齐开始了地下工作。药房是密谋完美的地方。很多抽屉、架子、角落和缝隙都可以放违禁物品，而人迹罕至的房间也不一定只能作为休息的地方。这个位于一楼的小房间远离他人的视线，是密谋者们重要的碰头点。他的颠覆活动没有长期保密下去。一段时间后，他因涉嫌在热舒夫地区组织起义而被捕。他的确协助预备起义，解救一名最近从监狱获释的激进分子，让他在一段时间内避免引起侵略者的注意。伊格纳齐先是在热舒夫的监狱里，然后他被转移到利沃夫。两年后，他被释放，但在依然生活在警察的监督下。他必须向每一个法庭传票报告。就在那时，伊格纳齐决定改变他的居住地，搬到他的兄弟方济各居住的利沃夫。在那里，他还在全市闻名归彼得·米科拉什“金星之下”的药房找到了一份工作。按理说，经过阴谋、被捕和坐牢之后伊格纳齐·武卡谢维奇应该安定下来，但当时…他一生中最伟大的冒险开始了。

### 大学与工厂

冒险开始之前武卡谢维奇进入大学学习。考上大学并不容易，由于伊格纳齐被囚禁后的臭名昭著。起初，当局不想批准这个捣蛋鬼上学，但最终，在他的雇主药店老板的帮助下，终于成功了。首先在利沃夫，然后是在克拉科夫雅盖隆大学学习两年。药学历

究不仅包括生物和化学课程，还包括了普通物理和岩石科学 - 岩石学。在这些课程中，伊格纳齐·武卡谢维奇第一次听到石油在制药业中的使用。

他在克拉科夫大学表现出色。是最优秀的学生之一。大学第一年他完成了所有科目。尽管满足了正式要求，但他不能提前参与硕士考试。虽然伊格纳齐的实际财务状况不良借此为由想要提前考试的请求也被拒绝。一位教授帮助他找工作，使他摆脱困境。最后一个学期，伊格纳齐转学到维也纳大学并在那里完成了他的硕士论文。通过考试之后武卡谢维奇返回到利沃夫以前工作的药房—在那里他有一项重要的任务。他的老板买了几桶石油，并让这位新注册的药剂师，负责检查石油是否可以使用以及如何如何在制药中使用。出人意料，药房实验室具有进行此类分析良好的条件。药剂师拥有必要的知识，房间本身也稍加改造从而进行化学分析。

武卡谢维奇通过净化石油，获得了一种亮黄色的物质，类似国外某种昂贵药物—*Oleum petrae album* 主要用于治疗皮肤病。为了能够从中获利，伊格纳齐和他的朋友们成立了三人合伙公司。该公司购买了大量石油，然后将其净化。成品以较低的价格提供给波兰和国外的许多药店。不过商家对这种价格便宜的替代品兴趣不大，因此伊格纳齐·武卡谢维奇的第一个商业计划失败了。

## 石油工业的开端

武卡谢维奇很固执，并决定将石油用于医疗以外的目的。他接下来的实验把锅炉中的原油加热到 200 摄氏度。经过一些额外的化学反应，他设法分离出煤油，其性质让他大为惊讶。它燃烧着明亮的火焰，但同样重要的是，它没有产生刺鼻的黑烟。此外，它比以前用于照明的油或纯化松子油便宜。过程并不容易。煤油不能用于现有的灯。这些灯在与具有不同物理化学性质的新液体一起使用时会发生爆炸。因此武卡谢维奇创造了第一盏圆柱形煤油灯，世界第一盏煤油灯照亮了他工作的药房。

1853 年 7 月 31 日被认为是世界石油工业的开端。当天晚上一个名叫 Bronisz 的护士冲进了药店。他从总医院跑过来，该医院要紧急进行外科手术。病人的状态非常严重，他很可能活不到第二天早上。问题是在那个年代，手术室没有人工照明。由于在利沃夫每个人都知道武卡谢维奇的发明，因此有史以来第一次用煤油照明进行手术的想法诞生了。夜间手术很成功。医院的管理人员相信产品的质量，逐渐将照明改为煤油灯，并购买了 500 公斤煤油。因此医院还节省下很多钱。毕竟这种新物质十分便宜。除了武卡谢维奇之外，没有人能够为自己的产品提供如此低的价格。

武卡谢维奇发现原油的潜力之后索性搬到了其矿藏所在的地方，即戈尔利采（Gorlice）。在那里，在他租赁的药房后面进行了进一步的蒸馏实验。都不是很安全的实验。其中一个实验几乎以悲剧告终。一场火灾几乎烧毁了整个房间。他需要在隔离的房间里经过蒸馏净化原油。尤其是因为对煤油的需求如此之大，以至于药房的设施已经不够用了。

赚来的钱武卡谢维奇投资到石油开采。他建造了竖井和更多的炼油厂。他的名气和财富都在增长。随之而来的大订单也证明了武卡谢维奇的信誉，例如购买大量煤油以照亮维也纳的整个火车站。

## 心地善良的人

火灾和事故频发，也是一个全新的行业快速发展。矿山和炼油厂不仅是石油开采和加工获利的地方，也是波兰专家进行实践学习的空间。武卡谢维奇本人已成为石油加工领域公认的国际权威。从石油中，他不仅获得了用于照明的物质，而且还获得了防止木材腐烂的润滑剂或地板上的沥青。但经营石油业务不仅仅是为了利润。武卡谢维奇心里是个社会工作者。在早年学习期间，他就无私地帮助了那些学习不易的人。武卡谢维奇参与了政治事务，并采取独立举措，以促进周围人民的生活。除此之外，他介绍了现代工人保险制度，每个人都得到免费治疗和药品，甚至在生病时支付福利金。他发放低息贷款，还资助农村青年读书。他自费建造的公路质量甚至好于奥匈帝国分区的其它公路。此外，他还资助了种植果园。还在路边种了果树。他在各个城镇建立了许多学校，并发起了培养未来矿工的机构的建设。他的家对许多游客开放——他欢迎移民和一月起义的参与者。这里也是他妻子的母亲和妹妹奥诺拉塔和瓦伦蒂娜的家——伊格纳齐老师年轻时的女儿，武卡谢维奇家族在他女儿去世后照顾了她。

武卡谢维奇的冒险始于一个在药房后面的简单实验。在那里他设法分离出了煤油。由于他的勤奋和坚持，他并没有就此止步。他很努力建造了世界第一个石油矿场。他建造炼油厂，并以后来的石油公司的形式创立了一家公司。尽管有很多困难，他还是成为了一个新行业的奠基人。这个行业从供应新式灯具的燃料开始，并发展成为现代许多经济体的重要组成部分。石油是制造汽油、油和许多合成物质的基本原料。开创了一个新的时代并不是武卡谢维奇唯一的优点。通过他的社会活动，他还帮助了许多同时代的人。由于他对他人的态度，他被尊称为“武卡谢维奇教父”——在获得荣誉的同时，他总是个好脾气、谦虚的人。

## **Ignacy Łukasiewicz (1822-1882)**

**Łukasiewicz was a pharmacist, oil specialist, and social activist. He was not talkative, but he was stubborn and hard-working. Maybe that is why he did not break down when the business did not go his way and refineries burnt down. At the same time, he was a man of great heart, who was very family-oriented. His virtues were recognized by the Pope himself, who bestowed upon him the dignity of chamberlain. His zeal for action became a driving force for many people. He was a pioneer of the oil industry and "Father Łukasiewicz," as grateful people grateful would call him.**

Ignacy Łukasiewicz was born into an impoverished noble family in Zaduszniki, currently in the Podkarpackie province. The family lived in a palace that was destroyed by fire twice. Despite these unpleasant experiences, Ignacy's childhood passed in a cordial atmosphere.

When he was eight, the Łukasiewicz family moved to Rzeszów. This decision was taken as a result of his father's illness and the need to see a doctor frequently. In the new place, young Łukasiewicz passed his primary school examinations, and together with his brother Franciszek he attended the high school in Rzeszów. He did very well at the Piarist Fathers' institution. However, only one of his brothers could continue his studies due to the family's financial problems. Even before his father's death, it was decided that it would be Franciszek. Therefore, after four years at school, Ignacy was to dedicate himself to learning the pharmacist profession. Why was this profession chosen for him? It is not entirely known. Why? Perhaps because of family traditions, or perhaps because of the boy's interests.

### **Pharmacist's Assistant in the Underground**

After four years of practice, Ignacy passed the exam, after which he became an assistant pharmacist. To take it, he had to learn how to read prescriptions and formulas. He also had to master pharmaceutical chemistry and the analysis of simple chemical compounds. This knowledge and experience with laboratory equipment came in very handy in the following years of his life. It was while working in a pharmacy that young Ignacy began to dream about university. Without a degree, he could not become a pharmacist and run his own business. He could only be an assistant pharmacist. People who worked with young Łukasiewicz remembered him as reticent and secretive but also very hard-working. He was also remembered as someone with a good heart, willing to help others, and dedicated to his family and friends.

Already when he was working as a pharmacist's assistant, Ignacy began to get involved in politics. Poland was then under the partition and young Łukasiewicz, like many others, wanted to change this state of affairs. Ignacy, therefore, began to act in the conspiracy. A pharmacy was an ideal place for this. Many drawers, shelves, nooks, and crannies could accommodate illegal content, and the out-of-the-way room did not have to serve merely as a resting place. This small room on the first floor, away from the eyes of onlookers, was a great contact point for the conspirators. He did not manage to hide his subversive activities for long because he was arrested on a charge of organizing an uprising in the region of Rzeszów. He helped to lead it, relieving a recently released activist, who for some time had to avoid attracting the attention of the invaders. Ignacy was firstly imprisoned in Rzeszów and then transferred to Lviv. After two years, he was released but lived under police supervision. He had to report for every court

summons. It was then that Ignacy decided to change his residence and moved to Lviv, where his brother Franciszek lived. He found a job with Piotr Mikolasch at a pharmacy known throughout the city as "Under the Gold Star." When it seemed that Ignacy Łukasiewicz, after the experience of conspiracy, arrest, and imprisonment, had settled down... the most incredible adventure of his life began.

### **Studies with a Factory in the Background**

Before this could happen, however, Łukasiewicz began his studies. It was not easy to enroll at the university. Ignacy had a reputation of a troublemaker who used to be in prison. At first, the authorities did not want to permit the rebellious student to study, but eventually, with the help of the pharmacy owner where he worked, they agreed. After Lviv, Łukasiewicz spent two years in Krakow at the Jagiellonian University. The pharmacy course included biology, chemistry, general physics, and the study of rocks - petrology. It was during these classes that Ignacy Łukasiewicz first heard about the use of crude oil in pharmacy.

His studies at the Cracow university went very well. Ignacy was one of the best students, and he passed all the subjects in his freshman year. Despite fulfilling the formal requirements, he did not manage to take the master's exam earlier. It did not help either that Ignacy argued his request with financial problems, which indeed bothered him. One of his professors saved him from the difficult situation by helping him find a job. For his final semester, Ignacy transferred to the University of Vienna and wrote his master's thesis there. Having passed his exams, Łukasiewicz returned to Lviv, to the pharmacy where he used to work - an important task was waiting for him there. His boss bought several barrels of crude oil and assigned the newly graduated pharmacist a mission to check whether and how to use it in pharmacy. Despite appearances, the pharmacy laboratory was an excellent place for such an analysis. The pharmacists were knowledgeable, and the room itself was suitable for chemical analysis.

Refining oil, Łukasiewicz obtained a light yellow substance that resembled some expensive foreign substance - *Oleum petrae album*, which was used mainly for skin diseases. Hoping to earn a lot of money, Ignacy founded a three-person company with his friends. The company bought quite a large amount of oil, which was then purified. The finished product was offered at a lower price to many pharmacies, both at home and abroad. However, there was little interest in the cheaper substitute, and Ignacy Łukasiewicz's first business initiative failed.

### **The Beginning of the Oil Industry**

However, Łukasiewicz was stubborn and decided to use oil for purposes other than medicine. He continued his experiments by heating the raw material in boilers at 200°C, without air. After several different reactions, he managed to separate kerosene, the properties of which astonished him. It burned with a bright flame, but what was equally important produced no pungent or black smoke. Besides, it was cheaper than the oil or camphine previously used for lighting. It was not without its problems, however. Kerosene could not be used in available lamps. They exploded in contact with a new liquid with different physical and chemical properties. Therefore, Łukasiewicz created the first cylindrical kerosene lamp, and the first examples of it lit up the pharmacy's interior, where he worked.

The beginning of the world oil industry is considered to be July 31, 1853. That evening, a nurse named Bronisz rushed into the pharmacy. He came from the General Hospital, where an urgent surgical operation had to take place. The patient's condition was very grave, and he probably would not live to see the morning. The problem was that in those days, surgical rooms had no artificial lighting. However, everyone in Lviv knew about Łukasiewicz's invention, hence the idea to operate by kerosene lamps for the first time in history. The night operation went well. The management of the hospital, convinced of the excellent quality of the product, replaced the lighting with kerosene lamps and ordered a supply of 500 kg of kerosene. It saved a lot of money. After all, the new substance was very economical. Nobody else but Łukasiewicz was able to offer such a low price for his product.

Seeing the potential in oil, Łukasiewicz moved to the place where its deposits were located, i.e. Gorlice. There, in the backroom of a pharmacy that he leased, he conducted further distillation experiments. They were not the safest. One of the experiments almost ended in tragedy. A fire broke out and consumed nearly the entire room. There was a need for a distillery, a separate room for purifying oil. The demand for kerosene was so high that the backroom of the pharmacy was no longer sufficient.

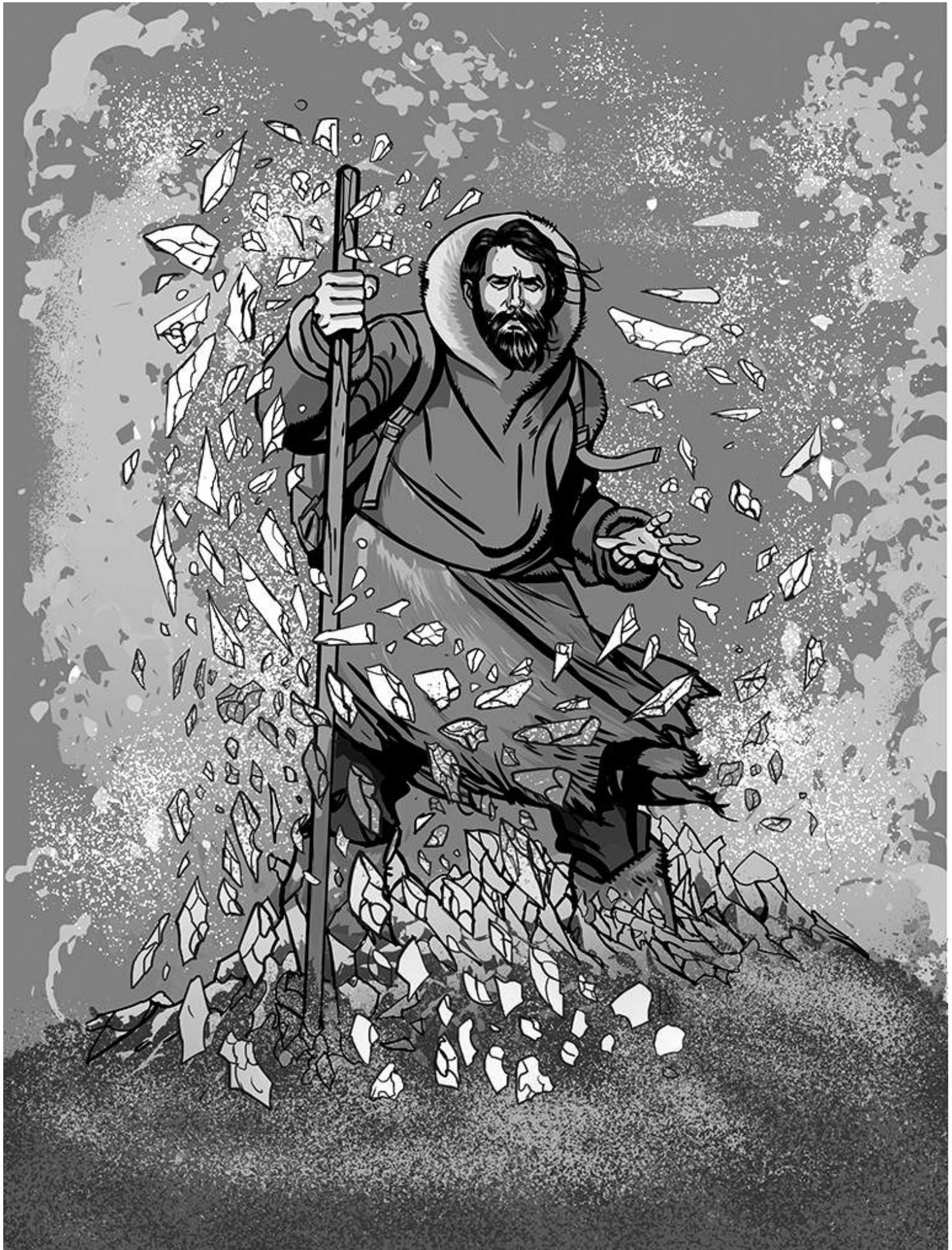
Łukasiewicz invested the money he earned in oil extraction. He built wells and other refineries. His fame, as well as his fortune, grew. He received prestigious orders, i.e. to provide large quantities of kerosene to light the entire Vienna railway station.

### **A man with a good heart**

Łukasiewicz experienced fires and accidents, but also the rapid development of an entirely new industry. Refineries and mines brought profit from oil exploitation and processing. They were also a place of practical learning for new Polish specialists. Łukasiewicz himself became an internationally recognized authority in the field of crude oil processing. He obtained substances for lighting and lubricants to protect wood against decay and asphalts for floors, among others. However, running an oil business was not only about profit. Łukasiewicz had a social spirit. It was already visible during his studies when he selflessly helped those who did not learn quickly. Łukasiewicz was involved in political matters and undertook independent initiatives to make the lives of those around him easier. He introduced a modern system of workers' insurance. Everyone received free treatment and medicines, and even an allowance paid out in case of illness. He gave out low-interest loans and supported rural youth who wanted to study. He used his own money to build roads, the quality of which - as it seems - was better than that of other roads in the Austrian partition. He also financed the establishment of orchards. He also planted roadsides with fruit trees. He built many schools in various towns and initiated the establishment of an institution preparing future miners for work. His house was open to many guests - he received emigrants and participants of the January Uprising. His wife Honorata's mother and sister lived there, and Valentina - Ignacy's teacher's daughter from his youth whom the Łukasiewiczz took care of after their own daughter's death.

Łukasiewicz's adventure began with a simple experiment in the backroom of a pharmacy, where he managed to isolate kerosene. Thanks to his perseverance and persistence, he did not stop there. With outstanding commitment, he built the world's first oil mines. He created refineries and founded a company in the shape of later oil companies. Despite many problems, he became the father of a new industry. At first, its aim was to power new lighthouses. It grew to become

a significant part of many economies in modern times. Oil is the primary raw material in the creation of gasoline, oils, and many synthetic substances. Launching an era is not the only contribution of Łukasiewicz. He also helped many of his contemporaries through his social activities. Thanks to his attitude towards others, he was called "father Łukasiewicz" - always a good-natured, modest man who always felt humbled when receiving an award or a distinction.



**亨利克·阿克托斯基 Henryk Arctowski (1871 - 1958)**

探索未知南极洲奥秘的极地探险家，气候学先驱。他的名字不仅在科学著作中出现，而且在世界地图上的多个地方也能找到他的名字。此外，一位文艺复兴时期的人，是许多领域的专家，表现出令人难以置信的毅力。但最关键的是，他是一位十分勤奋和富有创造力的人。这个人当他看到面前有障碍时，并没有放慢速度，反而加速快跑跳跃过去。

亨利克·阿克托斯基 1871 年出生于华沙。小时候姓阿克茨（Artzt），因为他的祖先两个世纪前从符腾堡移居波兰。这位未来的南极探险家最初在家学习，在那里他掌握了德语和法语。当他 10 岁父母给他报名上伊诺弗罗茨瓦夫的一所初中。学校所在的城市当时处于普鲁士统治之下，因此青年亨利克有机会用他学到的第一门外语。也许正是从华沙出发前往伊诺弗罗茨瓦夫，唤醒了亨利克对旅行的兴趣。不幸的是，伊诺弗罗茨瓦夫初中的老师们并不喜欢亨利克的爱国主义观点。在那所学校他只待了三年，由于受到骚扰，他的父母将他转送到比利时的学校。

亨利克·阿克托斯基（虽然当时还姓阿克茨）在比利时读完高中入大学了，学第一个专业。然而，他前往法国读别的专业。他在比利时学了天文学，但他的亲戚劝他换专业。他们认为天文学是不切实际的，因此亨利克开始读化学与地球化学以及岩石学和矿物学。他还学过地质学。他在巴黎索邦大学、自然历史博物馆、法兰西公学院及矿业学院探索了所有这些专业。

### 一个才华横溢的硬汉

22 岁时他从法国回到比利时列日，受雇于当地的一所大学。在那个年代这算是一个巨大的个人成就（其实，直到今日也是这样）。那时他开始使用阿克托斯基的姓，因为他想用“波兰语”签署科学论文。两年以内他发表了约 20 篇论文。尽管他在大学工作成功，但他还是辞去了这份舒适的工作。他被说服参加著名的比利时南极考察队，并成为该考察队的科学主任。他被考察队组织者阿德里安·德·杰拉什·德·戈梅里（Adrien de Gerlache de Gomery）一名海军军官说服加入了这次探险。在踏入未知领域之前，阿克托斯基拜访了英国、比利时和瑞士的杰出专家。他补充了其地质学、海洋学、气象学和冰川学方面的知识。凭借丰富的新知识与能力他与他的团队一起终于启航进入未知领域。世界的那些地区似乎从没有被探索过。在船上几位科学家中还有另一位波兰人—安东尼·博莱斯瓦夫·多布罗沃尔斯基（Antoni Bolesław Dobrowolski）。他负责繁琐的云和雪晶气象观测。

他们航行的船叫做“Belgica”。是一艘小帆船。由于资金有限，这艘船以前被使用过。尽管有这种不便，但它包含了所需的一切：有很多工作空间和一小块休息空间。毕竟，他们没有去旅游，而是去探索世界最大的未开发的区域。因此团队成员分工。阿克托斯基成为一名船上气象学家、冰川学家和海洋学家。

旅途并不轻松。在他们到达目的地之前，有一名船员遇难。他们还在风暴中幸存下来，并遇到了暗礁。最糟糕的事情还在后面。这艘船被困在浮冰中 13 个月！刚开始，探险队的成员试图挣脱，但最终放弃了。这并不意味着他们没有流动—这艘船和浮冰一起漂流了很远的距离。团队的另一名成员在越冬期间死亡，但科学研究和观察却一刻也没有中断。需要花费巨大的精力。船员在极夜期间在持续黑暗的条件下工作，并且坏

血病对他们的健康构成极大威胁。户外温度降到-45 摄氏度。在“比利时号 (Belgica)”之前，没有一艘船在南极冰层中过冬。随着极昼的到来气温上升，有机会让船脱离冰层。在整整 5 周的时间里，除了进行研究外，船员们靠体力工作在冰中开辟了一条通道，使船脱离这片冰域。这次探险当然是开创性的，但不仅仅是因为那里发生的故事。首先，收集了许多结果并进行了观察，这是开展进一步研究的基础。

## 我们欠他什么？

探险归来后，阿克托斯基放弃了地质研究。他受雇于于克勒的皇家气象台。虽然这是一个普通的助理职位，但亨利克在那里有良好的条件来汇编大量的结果，尤其是关于天气现象。研究结果以《比利时南极探险队》的联合标题出版了 10 卷。

当时，这位波兰研究人员将大部分时间用于研究地球的气候。他甚至成为了气象站的主任。从这开始其一生都在研究气候。渴望科学冒险，他计划组织另一个北极地区的探险，但找不到资金。因此，他前往斯匹次卑尔根岛和罗弗敦群岛进行了一次短途旅行。返回之后他移居美国。他曾在纽约公共图书馆工作，担任自然科学系主任。后来他回到波兰，在利沃夫扬·卡齐米日大学。他以为自己已经回到了自由独立的波兰。但 1939 年 8 月他和妻子前往美国参加大会。当他在海外时，第二次世界大战在欧洲爆发了，这让阿克托斯基一家一直待在美国度过余生。他们把一切都留在了波兰。他们不得不带着短途旅行随带的东西开始新的生活。享誉全球的科学家亨利克加入史密森学会，并在那里工作一直到退休。即便如此，他仍然追求自己的兴趣并积极从事科学研究。

尽管很难数清亨利克·阿克托斯基研究过的科学领域，但他最出名于他在持续两年多的比利时南极探险队期间的发现。探索后发布的著作十卷其中三个包含的内容今本上都是我们同胞的发现。其余七卷包含团队其他成员的研究和观测。阿克托斯基的著作包括全年气象观测，包括每小时云观测。他还描述了他对南极洲温度的结论。他发现它比以前想象的要低。阿克托斯基还发现了为什么被浅水淹没的大陆部分比预期深约 400 米。他认为原因在大量冰的压力。此外，他还撰写了气旋运动的理论。根据半球，气旋顺时针或逆时针移动。他还起草了一张地图，显示选定的南极海域的深度。

今日由数百个研究机构及世界上几乎每一所大学进行气候研究。当亨利克·阿克托斯基进行这项研究时，很少有人从事气候研究。而他的团队分析了世界上几乎每个陆地区域的气候变化。他还可以创造一种结合相关事实的谜题。他知道在两个半球发生的气候现象之间存在联系。此外，他是最早看到发生在太阳上的现象对天气和气候变化的影响的人之一。他写了许多关于太阳地球物理学的著作。包括将太阳黑子的位置与磁暴关系的研究。他还对观察到的变化对农业的影响感兴趣。他的研究也为天气预报的发展做出了贡献。他在国际气候变化委员会担任重要职务，最终成为其主席。

在波兰工作期间，他准备了一系列有关气候变化主题的文章。他从历史的角度展示了气候变化。第一卷含有 4150 项，按章节分类排序。他在美国继续接下来章节的工作。

## 科学家与爱国主义者

阿克托斯基不仅是一位出色的科学家，而且是优秀的管理者和组织者。他能够规划和实施大型研究项目包括国际范围的项目。他介绍了创新的解决方案和计划，然后在华

盛顿和布鲁塞尔的大会上介绍了它们。在那里他提议对南极洲进行第一次国际研究。此外，他还制定了穿越南极的计划，甚至起草了在此地建造气象站的计划。是他首先提议在斯匹次卑尔根岛建立一个波兰研究站。

虽然他住在国外但一直十分关心波兰的事务。第一次世界大战期间，他自愿在刚刚成立的和平委员会工作。在那里，他与他人共同撰写了一份 2500 页的报告，其中包括：波兰的人口、地质和自然资源。这份文件是在建立我国边界时使用的。作为委员会成员，他应邀参加了 1919-1920 年举行的巴黎和会。在那里，他与波兰代表团积极合作，讨论欧洲的命运。回到独立的波兰后，他被任命为教育部长，但亨利克·阿克托斯基选择在利沃夫的扬·卡齐米日大学工作。他所管理的学系很快就变成了地球物理与气象研究所。当时身在美国的他被第二次世界大战爆发的消息震惊，他与妻子，一位著名歌手阿里安·珍妮·艾迪（Arian Jeany Addy）一起开展慈善活动，帮助波兰。战争结束后，他帮助国内研究人员教育和购买他们需要的文献。

亨利克·阿克托斯基发表了 400 多篇科学作品。其中许多催生了新的科学领域。为表彰功绩，位于南极洲乔治王岛金钟湾波兰南极考察站以他的名字命名。该站于 1977 年启用，全年开放，由数座建筑物组成。此外，在极地许多地方都是以阿克托斯基的名字命名。在南极洲有阿克托斯基半岛、阿克托斯基山峰以及阿克托斯基冰原岛峰。在地球的另一个半球，在斯匹次卑尔根岛，有我们探险家的山脉和冰川。可以说，所有这些地方的名字对于我们的极地探险家来说都是梦想成真，他改变了名字，希望波兰能出现在世界科学界。

## **Henryk Arctowski (1871 - 1958)**

**Henryk Artowski was a polar explorer who studied the mysteries of unexplored Antarctica. He was also a pioneer of climatology. His name can be found in scientific works and in several places on the world map. In addition, he was a Renaissance man, an expert in many fields, who showed incredible fortitude. Above all, he was an extremely hardworking and resourceful person. When he saw some obstacles in front of him, he did not slow down but started to run to jump over them.**

Henryk Arctowski was born in Warsaw in 1871. As a child, he was called Artzt because his ancestors had moved to Poland from Württemberg two centuries earlier. The future Antarctic explorer was initially educated at home, where he mastered the German and French languages. When he was ten years old, his parents enrolled him in the gymnasium in Inowrocław. The town where the school was situated was then under Prussian rule, so young Henryk could speak the first of the foreign languages he had learned. Perhaps the trip from Warsaw to Inowrocław awakened the passion for travel. Unfortunately, his teachers in the junior high school in Inowrocław did not like Henryk's patriotic views. He spent only three years in school because due to the harassment he was subjected to, his parents transferred him to a school in Belgium.

Henryk Arctowski (although his surname was still Artzt) graduated from high school in Belgium and began his first studies. For his following studies, he went to France. In Belgium, he studied astronomy, but his relatives urged him to change the field. They thought that astronomy was impractical. Henryk began to study chemistry with geochemistry, petrography, and mineralogy. He also studied geology. He explored all these subjects at the Sorbonne in Paris, the Natural History Museum, the College de France, and the School of Mines.

### **A Smart Tough Guy**

From France, he returned to Liège and was hired at the university at the age of 22. In those days, it was an outstanding achievement (which has not changed to this day). He began to use the name Arctowski because he wanted to sign his scientific papers "in Polish." Within two years, he published about 20 of them. Despite excellent results at the university, he resigned from his stable job. He was persuaded to take part in the famous Belgian Antarctic Expedition, of which he also became the scientific director. Adrien de Gerlache de Gomery, a naval officer, convinced him to join the expedition. Before Arctowski set off into the unknown, he visited outstanding specialists in England, Belgium, and Switzerland. He expanded his knowledge of geology, oceanology, meteorology, and glaciology. Rich in new knowledge and skills, he finally set sail with his crew - literally - into the unknown. Those parts of the world were practically unexplored. Among several scientists on board, there was also another Pole - Antoni Bolesław Dobrowolski. His task was to deal with precise meteorological observations of clouds and snow crystals.

The ship they sailed on was called "Belgica." It was a small sailing ship and, due to limited funds, had already been used before. Despite this inconvenience, it had everything they needed: plenty of space to work and a little place to rest. After all, they sailed there not as tourists but to explore the most extensive unexplored area of the world. The crew members shared the workload. Arctowski became the ship's meteorologist, glaciologist, and oceanographer.

The journey was not an easy one. By the time they reached their destination, one crew member had died. They had also survived a storm and encountered underwater rocks. Unfortunately, the worst was still ahead of them - the ship was trapped in a field of ice for a long 13 months! At first, the expedition members tried to free themselves but eventually gave up. This does not mean that they did not move - the ship, along with the krill, drifted and traveled quite a distance. Another member of the team died, but scientific research and observations were not interrupted even for a moment. It was a tremendous effort. The ship's crew functioned in conditions of perpetual darkness during the polar night and at significant risk to their health from scurvy. Outside, the temperature was  $-45^{\circ}\text{C}$ . Before the Belgica, no ship had ever wintered in the Antarctic ice. As the temperature rose, there was a chance to get the ship out of the ice. For the entire five weeks, in addition to conducting scientific research, the crew worked physically to carve a channel in the ice for the ship to get out of the field of ice wheels. The expedition was groundbreaking, but not just because of the stories that happened there. Most importantly, the crew made many observations and collected data that served as a prelude to further research.

### **What We Owe Him**

After returning from the expedition, Arctowski gave up geological research. He got a position at the Royal Meteorological Observatory in Uccle. Although it was a modest post of assistant, Henryk had good conditions there to examine the results of the expedition, especially concerning weather phenomena. The findings were published in 10 volumes under the common title Expedition Antarctique Belge.

Even then, the Polish researcher devoted most of his time to studying the climate of the planet. He even became the head of the meteorological station. The climate was his great interest until the end of his life. Eager for scientific adventures, he planned another expedition to the Arctic regions but could not find the money for it. He sailed on a shorter trip to Spitsbergen and Lofoten. After returning, he moved to America. He worked in the New York Public Library, where he served as the natural history department director. Later, he returned to Poland to work at the Jan Kazimierz University in Lviv. He thought that he had returned to free Poland permanently. However, in August 1939, he and his wife left for a congress in the United States. While he was overseas, World War II broke out in Europe, which kept the Arctowskis in America for the rest of their lives. They left everything in Poland. They had to start a new life with what they took with them on their short trip. Henryk, an internationally respected scientist, took a job at the Smithsonian Institution, where he worked until his retirement. Even then, he pursued his passion and was scientifically active.

Although it is difficult to count the fields in which Henryk Arctowski was scientifically engaged, he is best known for his discoveries of the Belgian Antarctic Expedition, which lasted more than two years. Three out of ten volumes of the great work published after the expedition mainly presented our compatriot's discoveries. The remaining seven volumes presented the research and observations of other crew members. The volumes written by Arctowski included year-round meteorological observations, including hourly cloud observations. He also described his conclusions about the temperature of Antarctica. He found that it was lower than previously thought. Arctowski also found out why the part of the continent flooded by shallow waters lay about 400 m deeper than assumed. He saw the reason in the pressure of vast amounts of ice. In addition, he described the theory of the movement of cyclones. These, depending on the hemisphere, move clockwise or counterclockwise. He also made a map that showed the depth of selected Antarctic seas.

Today, climate research is conducted in hundreds of scientific institutes and at almost every university in the world. When Henry Arctowski conducted it, the climate was studied by few.

Yet his team analyzed climate change for nearly every area in the world. Arctowski was able to create a kind of jigsaw puzzle of interconnected facts. He knew that there was a connection between climatic phenomena happening in both hemispheres. In addition, he was one of the first to see the effect of what was happening on the Sun on weather and climate change. He also wrote several papers on the geophysics of the Sun. These included studies linking the location of sunspots to magnetic storms. He was also interested in the effects of observed changes on agriculture. His research also contributed to the development of weather forecasting. He held important positions in the International Commission on Climate Change, eventually becoming its chairman.

While working in Poland, he compiled a collection of articles on climate change. He put them in a historical aspect. The first volume published in Lviv had 4150 items. He worked on subsequent volumes in the United States.

### **Scientist and Patriot**

Arctowski was a great scientist and an excellent manager and organizer, able to plan and carry out extensive research programs, also international. He introduced innovative solutions and plans and presented them at congresses in Washington or Brussels. That is where he suggested the first international exploration of Antarctica. Moreover, he sketched a plan of an expedition across the South Pole. He even developed a plan of meteorological stations which could be built there. He was the first to propose the construction of a Polish research station on Spitsbergen.

He lived abroad, but Polish affairs were always on his mind. During the First World War, he volunteered to work in the Commission for Peace, which was just established.

Within its structures, he was active in the Commission for Polish Affairs. There he co-wrote a 2,500-page report on such things as demography, geology, and Poland's natural resources. This document was used when establishing the borders of our country. As a member of the commission, he was invited to the Versailles Peace Conference in 1919-1920, where he cooperated actively with the Polish delegation debating the fate of Europe. When he returned to independent Poland, he was offered the post of the Minister of Education. Still, Henryk Arctowski chose scientific work at the Jan Kazimierz University in Lviv. The department was quickly transformed into the Institute of Geophysics and Meteorology. When the war surprised him in the United States, together with his wife, a well-known singer Arian Jeany Addy, ran charitable campaigns to help Poland. After the war ended, he helped domestic explorers educate themselves and buy necessary literature.

Henryk Arctowski published over 400 scientific papers. Many of them gave rise to new fields of science. In recognition of his contributions, the Polish Antarctic Station, which is located on Admiralty Bay on King George Island in Antarctica, was named after him. The station was commissioned in 1977, is year-round, and consists of several buildings. In addition, many places in the polar regions that he tamed for world science hold Arctowski's name. In Antarctica, we can find Arctowski's peninsula, peak, or nunataks. On the other side of the globe, in Spitsbergen, we have the mountain and glacier dedicated to our discoverer. It can be said that the names of all these places are the fulfillment of the dream of our polar explorer, who, by changing his name, hoped that Poland would be present in world science.



卡齐米日·谢米诺维奇 Kazimierz Siemienowicz (约 1600 – 1651 后)

我们的同胞早在 17 世纪就为火箭登月任务奠定了基础。在对普通欧洲人来说欧洲大陆以外的世界就好比外太空的那个时代，这怎么可能？也许是因为卡齐米日·谢米诺维奇太不平凡了。

人们对他的青年时代知之甚少，据推测他出生于 1600 年，一个贫穷的贵族家庭。他在瓦迪斯瓦夫四世·瓦萨国王的军队中担任炮兵职务。他对炸药的兴趣促使他进行自己的实验，以改进大炮和枪支的设计。为了充分了解炮兵知识，他自学了数学、物理、化学等诸多领域的知识。在那个动荡，充满战争的时代，波兰立陶宛联邦不得不为维持与土耳其人、鞑靼人、俄罗斯人甚至瑞典人的边界而战。国王想创建配备新型武器的专业部队。因此他派遣谢米诺维奇去荷兰学习。返回波兰之后他获得了皇家炮兵工程师的职位，并开始用拉丁文撰写他的著作《*Artis Magnae Artilleriae pars prima*》（《伟大的炮兵艺术第一部分》）。

这本书以科学严谨的方式介绍了所有的炮兵知识。理论基础，参考了数学、物理和化学领域的近 200 项研究——这是一部真正的科学作品！除了理论之外，谢米诺维奇的书还包括了他多年实验的结果，这就是为什么他的作品是一本完整的教科书，为外行人打开了火炮秘密的道路。书里面几乎包含了一切。一整章专门介绍火箭、炮弹、烟花形式的烟火材料的生产，以及建造火药库的技巧。如果有人在爆炸实验中被烧伤，也有烧伤的治疗方法（由作者本人亲自测试的）。

谢米诺维奇在他的书中提出的最具革命性的想法是三级火箭的想法。他发明了一种由三部分组成的火箭，每部分在燃烧烟火材料时点燃另一部分并掉落。借助于这种结构，火箭比传统火箭飞得更快更远。这个想法听起来很熟悉吗？当然是一现在用于载人的太空火箭，包括用于阿波罗登月任务的土星五号，其建造理念完全相同！还有什么改善？卡齐米日同一时代的炮兵为了稳定火箭的飞行，挂上了长杆，就像在除夕烟花一样。谢米诺维奇发明了三角翼形状的三角镇流器。这种稳定剂今日仍在使用。

谢米诺维奇的著作成为畅销书。但作者本人好像没有足够时间享受自己的作品。他最后的痕迹是在书的法文译本签字。该译本出版于 1651 年，比原文书晚一年。他后来怎么样了？我们都不得而知。

## **Kazimierz Siemienowicz**

**Kazimir Semenovich (ca. 1600 - after 1651)**

**Already in the 17th century, our compatriot laid the foundations for rocket missions to the Moon. How is this possible when a trip outside the continent was already a cosmos for the average European inhabitant? Maybe because Kazimierz Siemienowicz was not average at all.**

We do not know much about his youth. It is assumed that he was born in 1600 as a poor nobleman. He held a position as an artilleryman in the army of King Wladyslaw IV Vasa. His interest in explosives pushed him to conduct experiments to improve the design of cannons and guns. To fully understand artillery knowledge, he independently undertook to study many fields such as mathematics, physics, and chemistry. Times were troubled and full of wars. The Polish-Lithuanian Commonwealth had to fight to maintain its borders with Turks, Tatars, Russians, and even Swedes. The king wanted to create specialized troops armed with a new kind of weapon. Therefore, he sent Siemienowicz to study in the Netherlands, which is today's Holland. After his return, he was given the position of the crown artillery engineer and started creating his great work *Artis Magnae Artilleriae pars prima, or The Great Art of Artillery Part One*, which he wrote in Latin.

The book presented all artillery knowledge in a scientific, not a craft, manner. Theoretical basis references to almost two hundred researches in mathematics, physics, and chemistry - it was real scientific work! In addition to theory, Siemienowicz included the results of his experiments. His work became a complete textbook opening the way to the secrets of artillery for the layman. Literally, everything was there - a whole chapter on the production of materials used in pyrotechnics in the form of rockets, bullets, fireworks, as well as tips for the construction of powder depots. If someone was burned due to explosive experiments, he could use ways to treat burns (tested on his skin by the Author).

The most revolutionary idea that Siemienowicz presented in his book was the idea of a three-stage rocket. He invented a rocket made of three parts. Each part would burn its pyrotechnic material and cause the next piece to ignite and fall off. With this design, rockets flew faster and much farther than conventional rockets. Doesn't this idea sound familiar? Of course, it does - today, space rockets, including the Saturn V, used in the Apollo manned moon missions, are built the same way! What else has been improved? Kazimierz's contemporaries used to attach long poles to rockets to stabilize their flight - just like the ones used in New Year's Eve fireworks. Siemienowicz invented delta stabilizers in the shape of triangular wings. Such stabilizers are in use today.

Siemienowicz's work became, as we would say today, a bestseller. The Author himself probably did not enjoy his work long. The last trace of his existence is an inscription in a French translation of his book of 1651.

What happened to him later? We do not know.



卡齐米日·埃格伦 Kazimierz Żegleń (1869 – 1910)

并不是每个人都像他一样对自己的发明充满信心。为了让人们相信他的背心能挡子弹，他让人向自己开枪。他的演出给观众留下了深刻的印象。

他出生于奥地利分区，对他的青年时期知之甚少。第一条可以确定的信息是他 18 岁时加进入了一个宗教团体。然而，他 21 岁时被派到芝加哥与美国的波兰侨民一起工作。

卡齐米日·埃格伦目睹了对芝加哥市长的袭击，这件事不仅震惊了他，而且也在某种程度上塑造了他。市长被杀，而卡齐米日决定制造可以保护人们免受子弹伤害的衣服。他为此努力了几年，但最终成功了。埃格伦并不是第一个人尝试的人，但他的竞争对手使用钢板来保护身体。这些都是沉重的，不舒服的，而我们同胞的想法却完全不同。他创造了一种防弹背心，由几层或十几层丝绸组成，这是当时最耐用的纤维。实际上连续拉伸的材料层可以更好地吸收子弹的实力，将其散布在一个大的表面上。为了进一步增强背心的效果，纤维被浸泡在一种特殊的物质中，但埃格伦没有透露给任何人它的成分。他手工制作背心，将材料一层一层地缝在一起。这是一个严重的问题，因为由于手工制作，并非所有的产品都具有相同的耐用性。织物中有较弱的元素可以让子弹通过。只有机织才能保证同样的耐用性。不过卡齐米日在美国没有找到合适的制造商。他并没有放弃，前往欧洲继续寻觅。于 1898 年初他会见了另一个波兰人杨·塞切帕尼克（您可以在第... 页阅读有关他的信息）。他当时已经是世界有名的发明家，以其革命性的编织设备而闻名。两位先生达成了一致。塞切帕尼克根据埃格伦的理念改造其机器连续编织背心。效果超出了他们的预期。面料挡住了步枪和手枪的子弹。两位先生积极推广该产品，埃格伦在美国，塞切帕尼克在欧洲。为了展示背心的特性，埃格伦常常自己穿上他的发明，并发出向他开枪的命令。这些他组织的表演记录都被保留下来了。表演其间，向缝制马甲的材料片开枪，令观众高兴的是，子弹并没有刺穿它们，而是落在地上。

卡齐米日·埃格伦多次改进了他的发明。后来他与塞切帕尼克分道扬镳，设立了自己的公司，并专心于防弹背心销售。有趣的是，他在生产汽车轮胎和装甲板时使用了他的防弹织物。这比背心更受欢迎。然而最终武器的发展超过了个人盔甲的技术，因此在一战和二战期间钢板的设计被重新启用。钢板一直使用到高柔韧合成纤维的发明。不过卡齐米日没有看到战争的爆发，很可能他于 1910 年逝世，余生都在芝加哥生活和工作。

## **Kazimierz Żegleń (1869 – 1910)**

**Not everyone has as much confidence in their inventions as he did. To convince people that his vest stops bullets, he had people shoot at him. His demonstrations were impressive.**

He was born in the Austrian partition, but little we know about his youth. The first certain information is that at the age of 18, he entered an order. However, when he was 21, he was sent to Chicago to work with the American Polonia.

The event that shocked him and shaped him was an assassination attempt on the mayor of the city, which Kazimierz Żegleń witnessed. The mayor died, and Kazimierz decided to construct a garment that would protect people from bullets. He worked on it for several years but finally succeeded. Żegleń was not the first to try, but his competitors used steel plates to protect their bodies. These were heavy and uncomfortable, while our compatriot's idea was completely different. He created a bulletproof vest consisting of several or more layers of silk, the most durable fiber at the time.

Contrary to appearances, the successively stretched layers of material better absorbed the bullet energy, distributing it over a large area. To further strengthen the effect of the vest, the fibers were soaked in a special substance, the composition of which Żegleń did not reveal to anyone. He made his vests by hand, sewing the material together layer by layer. This was a serious problem because not all of the pieces were equally strong due to the hand-made work. There were weaker pieces of fabric that let bullets through. Only machine weaving could ensure equal durability. However, despite his search, Kazimierz could not find a suitable manufacturer in the United States. However, he did not give up and set out for Europe. At the beginning of 1898, he met with another Pole. Jan Szczepanik (you can read about him in this book) was already a world-class inventor known for his revolutionary weaving devices. The gentlemen came to an agreement, and Szczepanik adapted his machines to serial vest weaving following Żegleń's idea. The effect was more than satisfactory. The fabric stopped rifle and pistol bullets. Both men were eager to advertise the product, Żegleń in America and Szczepanik in Europe. To demonstrate the properties of the vest, Żegleń would put his invention on himself and give people the order to shoot him. There are many accounts of demonstrations that he held. To the delight of the audience, the bullets did not pierce the vest but fell to the ground.

Kazimierz Żegleń improved his design several more times. He parted ways with Szczepanik, set up his own company, and began selling vests in earnest. Interestingly, he used his bulletproof fabric to produce car tires and armor plates, which were much better received than the vests. Eventually, however, weapons development outpaced body armor technology. During World Wars I and II, the steel plate idea was reintroduced. The plates were used until the Kevlar's invention of highly flexible synthetic fibers. Kazimierz did not live to see the outbreak of war and probably died in 1910, living and working in Chicago for the rest of his life.



## 玛格达莱纳·本齐斯瓦夫斯卡 Magdalena Bendzislawska (17-18 世纪)

她在全球范围内史无前例。17 世纪她在维利奇卡盐矿成为外科医生。在这个职业只由男性从事的时代，玛格达莱纳·本齐斯瓦夫斯卡不仅证明了自己的能力，而且证明了勇气和自信。

17 世纪的医学与现在不同，不仅因为知识水平，也涉及到获得从医的许可，尤其是被称为“外科治疗的理发师”外科医生。玛格达莱纳·本齐斯瓦夫斯卡的丈夫—瓦伦丁，是外科医生，照顾了维利奇卡盐矿里受伤的矿工。玛格达莱纳一直作为他的助手，并很称职。她丈夫死亡后她接任了他的职责。这个情况不太符合当时的传统模式。

由于多种原因，这成为了一个特例。首先，联合外科治疗的理发师的公会圈子里只有男人。其次，因为组织的严肃性和国王本人的信任，公会受国内法律和习俗的指导，对各个情况提供了合适的解决方案。“管理”寡妇的命运属于这种情况之一。寡妇为了不致一贫如洗，可以接管已故丈夫的生意。唯一的条件是需要找到合适的人来接管。由于无法接受失败，一般都是由熟练的学徒接管。这件事非常严肃，因为拥有矿山的统治者关心工人。并不是出于好心，而是因为他们开采盐矿获得了巨额利润。早在 1289 年，根据亨利四世普罗布斯王子 (Henryk IV Probus) 的命令，在维利奇卡建立了一个澡堂，矿工可以在那里享受外科治疗的理发师的照顾。1363 年，卡齐米日大帝 (Kazimierz Wielki) 建立了一家医院与收留所。在那里工作的僧侣不仅治疗病人，还照顾残疾老矿工。所有这一切都是由矿山的钱资助的。若本齐斯瓦夫斯卡不会熟练地使用她从丈夫那里继承的工具，没有人敢冒这样的“尝试”风险。

于 1834 年《克拉科夫周刊》( *Tygodnik Krakowski* ) 出现了有关本齐斯瓦夫斯卡介绍的转载。该文件很可能与有关本齐斯瓦夫斯卡其它信息一起在 1850 年的克拉科夫大火中被烧毁。该文件中有《女外科医生》主题的一篇报道。文章中用波兰语及许多拉丁语插入语提到了皇家委员会在维利奇卡的访问。该文提到了瓦伦丁外科治疗的理发师遗孀首先提交了扬三世·索别斯基 (Jan III Sobieski) 签发给她丈夫的相关文件 (皇家特权)，然而类似文件由奥古斯特二世 (August II Mocny) 授予她。该文件确认了玛格达莱纳·本齐斯瓦夫斯卡适当的知识和技能。

第一位女外科医生有什么责任范围？她一定履行了当今牙医的职责 (不过限于拔牙，不包括牙齿治疗)。她肯定参与了创伤手术，从普通的伤口或擦伤，到在地下工作时很容易发生的骨折和伤害。众所周知，当时的工作条件，从照明到安全，都难以与当今的条件相比。值得一提的是，当时的手术是在没有麻醉的情况下进行的，因此除了自信之外，需要有过人的胆量。

## **Magdalena Bendzislawska (17th century - 18th century)**

**She was a phenomenon on a world scale. She became a surgeon working in the salt mine in Wieliczka in the 17th century. In the profession reserved exclusively for men, Magdalena Bendzislawska proved her competence, courage, and self-confidence.**

Medicine in the 17th century was different from today - not only because of the state of knowledge. There was a strict belief that certain men could practice medicine and become a surgeon, called a barber at that time. A surgeon was Magdalena Bendzislawska's husband, Walenty, who took care of injured miners in Wieliczka. Magdalena was his assistant, as it turned out, a very competent one. After her husband's death, she took over his duties. Her decision did not quite fit into the traditional scheme of those times.

The situation was unusual for many reasons. Firstly, the guilds associating barbers accepted only men. Secondly, because of the seriousness of the organization and the trust of the king himself, they were governed by internal laws and customs that had proven solutions for various contingencies. One of these was the "management" of the fate of widows. They could take over the business after their deceased husbands so that they would not become impoverished. The condition was that they find a suitable person who would take over the practice and the medical responsibilities. The guild did not accept random barbers, so it must have been a skilled professional who would take over the master's duties. The matter was important because the rulers to whom the mines belonged cared about the workers. Probably not out of the good heart, but because of the enormous profits they made from salt-mining.

Already in 1289, Duke Henry IV Probus ordered the establishment of a bathhouse in Wieliczka, where miners could use the services of a barber. In 1363, Casimir the Great founded a hospital and a hospice. The monks working there treated the sick and took care of the disabled and old miners. It was financed with money from the mine. If Bendzislawska was not skilled enough to make good use of the tools inherited from her husband, no one would risk employing her.

The 1834 issue of *Krakow Weekly* featured a document about Bendzislawska. Unfortunately, the original burnt during the great fire of Krakow in 1850. It contained a note entitled *Woman Surgeon*. It described, in both Polish and Latin, a visit of a royal commission to Wieliczka. The documents contained information about a widow of a barber Walenty. She presented a royal privilege to practice the profession of a barber issued by Jan III Sobieski to her husband. She also showed a similar one issued by Augustus the Strong granting this privilege to her. The document confirmed Magdalena Bendzislawska's appropriate knowledge and skills.

What were the duties of the first female surgeon? She probably performed the responsibilities of today's dentists (although certainly limited to removing teeth, not treating them). She certainly had the most frequent contact with trauma surgery, ranging from everyday injuries or abrasions to fractures and injuries, which were not difficult to come by working underground. It is well-known that the working conditions those days were poor - from proper lighting to safety measures. All the medical procedures were performed without anesthesia, so the surgeon's confidence had to be accompanied by nerves of steel.



威廉敏娜·伊瓦诺夫斯卡 Wilhelmina Iwanowska (1905 - 1999)

在她的一生中，尤其是在科学生涯中，她不仅为自己的发展而奋斗，也为同事和学生的发展而奋斗。是威廉敏娜·伊瓦诺夫斯卡成功地将宇宙扩大了两次。怎么实现的呢？通过她喜爱的星星的研究。

未来的教授出生在维尔纽斯。她在斯蒂芬·巴托里大学学习数学。一个偶然的机缘，让她开始了天文学的研究。她读大学三年级时，一节课结束后，天文学讲师瓦迪斯瓦夫·齐乌尔斯基（Władysław Dziwulski）教授向她提问。他向她提议与两名同学一起档助教。这是一个巨大的荣誉。

这位维尔纽斯天文台的员工研究了天体力学，即天体的运动和万有引力的作用，恒星的运动并确定它们的距离以及亮度。不幸的是，她的科学工作被战争打断了。苏联红军占领维尔纽斯地区，大学被迫关闭。许多学者在战争期间在前线、聚集区或在卡廷死亡。其余教职员工在维尔纽斯教授秘密教育。战争结束后开始遣返—威廉敏娜被送到托伦。在那里建立的大学以尼古拉·哥白尼的名字命名，因此三位天文学家建立天文学和天体物理学系的雄心是在哥白尼的家乡建立一个强大的科学中心。这个任务并不容易。工作人员除了自己的知识以外，一无所有。他们没有书籍、工具、设备，而且在五年的战争中，他们无法获得科学文献。尽管如此，他们还是很快开始了他们的讲座。伊瓦诺夫斯卡开始与其它城市的科学家合作，与它们交换书籍和出版物。例如，收到了来自波兹南的科学家捐赠的镜头。赠送的镜头使托伦未来天文台的制造第一台望远镜。由于她在瑞典的人脉，她获得了另一个有价值的设备—摄星镜。

天文学家女士的工作很快受到赞赏。1948 年获得奖学金赴美留学，先后在六大天文台工作。在那里，她认识了许多知名人士，并收到了几份工作邀请。尽管如此，她还是决定返回波兰。她始终认为，在家乡的生活比在西方的富裕国家的生活更有趣，体验也更丰富。

回到波兰后，她和年轻的员工一起在皮瓦尼斯镇（Piwnice）新建的、设备简陋的天文台开始研究。在那里她研究了不同类型的恒星。她尤其对造父变星，即定期缩小尺寸与光度的恒星感兴趣。星系距离尺度是基于造父变星的观察假设的，并且结果证明假设小了两倍。她同时与另一位科学家沃尔特·巴德（Walter Baad）进行了纠正。她的研究受到其他国家天文学家的赞赏，并衷心地邀请威廉敏娜参加国际会议。中共当局多年不许她出国。仅在 20 世纪 60 年代情况略有改善。伊瓦诺夫斯卡教授有意愿前往外国中心，这样她就能够将天文和科学领域最新的消息以及大学买不起的仪器带回当时受限制的波兰。

退休之后她并没有放慢生活的节奏。第二天就接受邀请前往高加索地区做了几次演讲。她于 1999 年逝世。她没有组建家庭。把一生都奉献给了工作。

## **Wilhelmina Iwanowska (1905 - 1999)**

**Throughout her life, and especially during her scientific career, she fought not only for her own development but also for the development of her colleagues and students. It was Wilhelmina Iwanowska who succeeded in making the universe twice as large. How did she do it? By studying her beloved stars.**

The future professor was born in Vilnius. She studied mathematics at Stefan Batory University. The fact that she devoted herself exclusively to astronomy was a coincidence. When she was in her third year of studies, the lecturer of astronomy, Professor Władysław Dziwulski, stopped her after one of the classes. He suggested that she, together with two colleagues, take up an assistantship. It was a great ennoblement.

The employees of Vilnius Observatory studied celestial mechanics, i.e., the movement of celestial bodies in the gravitational field, the study of the movements of stars and the determination of their distances, and the study of stars' brightness. Unfortunately, her scientific work was interrupted by the war. The Red Army occupied Vilnius, and the university was closed. Many scientists died during the turmoil of war at the front, in ghettos, or the Katyń massacre. The remaining staff members conducted secret teaching in Vilnius. After the war ended, repatriation began - Wilhelmina ended up in Toruń. The university in Toruń took the name of Nicolaus Copernicus. The ambition of the three astronomers who founded the astronomy and astrophysics department was to build a solid scientific research group in his hometown. The task was not easy. The scientists possessed nothing but their knowledge - they had no books, no tools, no equipment.

Moreover, because of war, they had no access to scientific literature. Nevertheless, they quickly began lecturing. Iwanowska began to cooperate with scientists from other cities, with whom she exchanged books and publications. As a result, for example, she received a lens donated by scientists from Poznań. It allowed the first telescope for the future observatory in Toruń to be created. Another valuable piece of equipment, an astrograph, was obtained thanks to her acquaintances in Sweden.

Iwanowska's findings of the astronomer were quickly recognized. In 1948, the astronomer was awarded a fellowship in the USA. She worked at a total of six leading observatories. She met many eminent personalities and received several job offers. Nevertheless, Iwanowska decided to return to Poland. She always believed that life in her home country was more exciting and richer in experiences than in wealthy Western countries.

After returning to Poland, Iwanowska and her young colleagues started research in a newly built and modestly equipped observatory in Piwnice. She studied various types of stars, but was particularly interested in cepheids, i.e., stars that periodically decrease their size and brightness at the same time. The scale of distances between galaxies, which turned out to be twice too small, was based on her observations. She corrected it simultaneously with another scientist, Walter Baad. Astronomers respected her accomplishments, and they willingly invited Wilhelmina to international meetings. Unfortunately, the communist authorities did not allow her to leave for many years. The situation improved somewhat only in the 1960s. Iwanowska was eager to travel to foreign research centers. These visits allowed her to learn about the latest research results in astronomy and work on modern scientific instruments, which the university could not afford to buy.

When she retired, she did not slow down her pace of life. The next day she accepted the invitation and traveled to the Caucasus to give several lectures there. She died in 1999. She devoted her entire life to her work.



汉娜·赫斯菲尔德 Hanna Hirszfaldowa (1884 – 1964)

一天晚上，赫斯菲尔德一家被巨大的爆炸声惊醒，以为炸弹落在了他们经营的医院里。汉娜没有逃跑，而是冲向医院抢救包含她研究报告的笔记本。

汉娜·卡斯曼 (Hanna Kasman) 出生在华沙附近。是一个非常有才华的人，16岁的她获得了高中文凭。首先，她在法国学习医学，然后前往柏林深造。她嫁给了卢德维克·赫斯菲尔德，后者也是一名医生和细菌学家。此外，他们俩在他们的科学工作中都参与了血液检测。汉娜和卢德维克结婚得早，他们是形影不离的生活伙伴，也是科学工作中的搭档。

第一次世界大战爆发时，赫斯菲尔德夫妻俩住在瑞士。瑞士是一个中立国，没有参加敌对行动。不过卢德维克决定利用自己的医学知识，志愿到塞尔维亚军队工作，治疗斑疹伤寒疫情。汉娜知道人们需要帮助，无法专注于她平静的工作。几个月后，她来到了塞尔维亚的瓦列沃，作为一名军医，她以极大的奉献精神抗击伤寒疫情。前线被突破时，外国使团被疏散，赫斯菲尔德前往希腊塞萨洛尼基。在那里，他们处理传染病，特别是伤寒、痢疾和疟疾的治疗。当时，汉娜负责医院的一个科室。她和丈夫一起进行了血型研究。血型的确定是他们最重要的研究成果。

第一次世界大战后，赫斯菲尔德家回到已经独立的波兰，但一开始处境艰难。由于通货膨胀，在瑞士赚的钱贬值了。卢德维克开始在流行病学研究所工作。汉娜前往大学儿科诊所担任志愿者。一段时间后，她成为了大学儿科诊所的负责人。儿童疾病成为她的专长。在两次世界大战期间，关于这个主题她写了大约 40 篇科学论文以及一本书，并且亲将这本书翻译成法语。她还翻译了她丈夫的论文。

第二次世界大战开始，这完全改变赫斯菲尔德一家的生活。他们俩作为医生都参与了华沙保卫战。汉娜必须同时肩负许多职责：她管理着诊所的卫生和救援中心，为托儿所提供医疗服务，当伤员开始抵达城市时，她在一天内在萨斯卡康帕（华沙市区）的校舍内开设了一家医院。每天，为了去医院，她都冒着生命危险。有一段时间，战线距离赫斯菲尔德家仅有一百米，子弹和炮弹在空中呼啸而过。

1941 年华沙投降后他们被安置到聚集区。即便在那里，他们也从事着科学研究和工作。当时，汉娜是沃拉（华沙市区）一家医院婴儿病房的负责人。尽管她和她的女儿能够逃跑，但她不想抛弃她的丈夫。

战后赫斯菲尔德家居住在弗罗茨瓦夫。充满精力汉娜开始组织卫生医疗服务，共同创办了医学科学院（今天的医科大学）。她还负责着儿科诊所的建立。1946 年，她前往美国，在那里她设法为贫困的波兰儿童获得了数吨食物。她在弗罗茨瓦夫工作直至 1964 年逝世。

## **Hanna Hirszfellowa (1884 – 1964)**

**One night, when a powerful explosion woke up the Hirszfeld family, they thought a bomb had fallen on the hospital they ran. Instead of running for her life, Hanna rushed to save a notebook with the research results.**

Hanna Kasman was born near Warsaw. As a very talented person, she passed her high school diploma exam at the age of 16. First, she studied medicine in France and then in Berlin. She married Ludwik Hirszfeld, who was also a doctor and bacteriologist. Both of them focused on blood research in their scientific work. Hanna and Ludwik married young and were inseparable, also in scientific work.

When World War I broke out, the Hirszfelds lived in Switzerland, which established neutrality and did not participate in the war. Ludwik, however, decided to serve with his medical expertise and volunteered to work in the Serbian army to treat an epidemic of spotted fever. Hanna could not focus on her quiet work, knowing that people needed help. A few months later, she found herself in Valjevo, Serbia, where she fought the epidemic with great sacrifice as an army doctor. When the front was broken and the foreign missions evacuated, the Hirszfelds went to Thessaloniki, Greece. They treated infectious diseases, especially typhoid fever, dysentery, and malaria. Hanna headed one of the hospital's wards at the time. Together with her husband, she researched blood groups. It was the determination of blood groups that proved to be their most important achievement.

After World War I, the Hirszfelds returned to independent Poland, but initially, their situation was complicated. The money they had earned in Switzerland lost its value due to inflation. Ludwik began working as a researcher at an epidemiological institute and Hanna as a volunteer at a university pediatrics clinic. After some time, she became its head. Children's diseases became her specialty. In the interwar period, she wrote about 40 scientific papers and a book on this subject which she translated into French herself. She also translated her husband's works.

The Hirszfelds' lives changed entirely at the beginning of World War II. As doctors, they both helped to defend Warsaw. Hanna had to combine many functions: she managed the sanitary and rescue center at the clinic, she took care of the nursery, and when the wounded started arriving in the city, she needed only one day to open a hospital in a school building in Saska Kępa district. She risked her life every day to get to the hospital. At one point, the front was a hundred meters from the Hirszfelds' house, and bullets and artillery shells whistled through the air.

After the capitulation of Warsaw in 1941, the couple was resettled in the ghetto. Even there, they continued to study and work. At the time, Hanna was the head of the infant ward in the Wola hospital. Even though she and her daughter could have escaped, she refused to leave without her husband.

After the war, the Hirszfelds settled in Wrocław. Hanna started to organize medical care with her usual energy and co-founded the Medical Academy (today, the Medical University). She also headed the establishment of the Pediatric Clinic. In 1946, Hanna traveled to the United States, where she encouraged people to donate several tons of food for needy Polish children. She worked in Wrocław until she died in 1964.



希拉里·科普罗夫斯基 Hilary Koprowski (1916 – 2013)

有趣的是，虽然对科学家刻板的印象是他们应该都很无聊，几乎在实验室里度过一生，但是实际上他们的生活丰富多彩，充满令人惊讶的转折。希拉里·科普罗夫斯基就是典型的例子。他研发了脊髓灰质炎疫苗，一种导致海涅-梅丁氏病的病毒。

1992 年《Rolling Stone》（《滚石》）期刊发表文章称，世界一流的病毒学家和免疫学家希拉里·科普罗夫斯基对艾滋病在非洲的蔓延负有责任。黑猩猩是艾滋病毒携带者，其生物材料将用于生产脊髓灰质炎疫苗。通过将疫苗接种给人类，来自动物的病毒将进入人体。虽然《滚石》并不是科学期刊，而是音乐期刊，但信息迅速传遍全球。指控的虚假性很快得到证实，但这没有太大的关系。在法国，甚至拍了一部纪录片《世界已经疯了吗？艾滋病从何而来》。当时已经知道科普罗夫斯基的疫苗与艾滋病无关。在《自然》和《科学》杂志上，三个独立的科学家团队发表了论文证实了这一点。即便如此，今日仍然有人认为艾滋病是由疫苗引起的。

## 疫苗

希拉里·科普罗夫斯基于 1916 年出生在华沙。虽然他毕业于华沙医学大学，但是他的人生计划多与音乐有关。他还从华沙音乐学院毕业，战前他前往罗马继续在音乐领域深造。他从意大利航行到巴西，在那里他以演奏和教授钢琴为生。在里约热内卢的海滩上与他在波兰学习医学的朋友的一次偶然相遇改变了他的生活。这位朋友说服他从事科学。他肯定有强有力的论据，因为不久后科普罗夫斯基搬到美国并开始实验室工作。最初他对老鼠展开研究。这些动物虽然感染了脊髓灰质炎病毒，但没有表现出海涅-梅丁病的症状。科普罗夫斯基收集受感染动物的脑组织切片，然而经过处理后注射了给另一批老鼠。他多次重复这个过程，最终分离出相当弱的脊髓灰质炎病毒。

1950 年研发了有效的脊髓灰质炎疫苗，而随后几年在刚果进行了第一次大规模疫苗接种。几周内就有超过 20 万名儿童在那里接种了疫苗。疫苗接种很方便，因为是口服的。在刚果进行大规模疫苗接种时，波兰爆发了这种疾病的流行病。从 50 年代起，越来越多的儿童患上了海涅-梅丁病。50 年代末年发病率高达 6 千人。当时科普罗夫斯基已经是病毒学和免疫学领域的知名人士，他从疫苗生产公司那里获得了 900 万剂疫苗，并免费送到了波兰。接种疫苗后的第一年，新增的海涅-梅丁病例数从 6000 例下降到 1000 例，两年后又下降到几十例。与此同时，儿童死亡率从数百例下降到仅两例。

## >> 疾病

脊髓灰质炎病毒引起所谓的脊髓前角炎症。该病由雅各布·海涅和卡尔·奥斯卡·梅定两位研究人员独立描述。所以也被称为海涅 - 梅定氏病。病毒通过消化道进入人体。通常是当孩子喝脏水时，例如在湖或游泳池游泳时。病毒受体存在于许多不同的细胞中，但病毒最常攻击神经系统细胞，特别是脊髓细胞。这会导致神经麻痹和肌肉松弛。被病毒袭击的人拄着拐杖或坐在轮椅上。当病毒感染大脑时，最常导致儿童死亡。该病毒也会攻击呼吸肌。患有这种疾病的人因为无法呼吸而窒息，孩子的胸部停止工作，肺部也停止工作。

事实上，防止这种情况发生的唯一方法就是所谓的铁肺（孩子被关在铁桶里，只有他的头伸出外面）。当密封腔中央的压力下降时，空气被小病人的口鼻吸入肺部。通常，孩子在铁肺中待了几个星期，但仍然有永久性瘫痪的情况。

在疫苗发明之前，每年有数十万儿童患上海涅 - 梅定氏病。在富裕国家于 20 世纪的 50 年代末开始接种疫苗，结果是病例迅速减少。在非洲和亚洲国家，直到 80 年代初才开始定期接种疫苗。事实上，整个 80 年代和 90 年代初期，感染人数迅速下降。不过那时候已不再使用科普罗夫斯基疫苗，而是使用阿尔伯特·沙宾——出生于比亚韦斯托克，并与科普罗夫斯基一样在美国工作的波兰人——改进的疫苗。

## >>人物

当前，世界上还出现这种疾病的孤立病例。官方称，欧洲自 2001 年以来宣布为无脊灰状态。借助于希拉里·科普罗夫斯基提供的疫苗，波兰成为欧洲最早消除海涅-梅丁氏病的国家之一。希拉里·科普罗夫斯基管理着费城托马斯杰斐逊大学的生物技术和高级分子医学研究所以及神经病毒学中心直到他去世。他还成立了一个基金会，帮助年轻的波兰科学家。他是 850 多篇科学论文的作者，他为开发狂犬病和发烧疫苗做出了贡献。他对癌症、多发性硬化症和转基因生物对生物体的影响进行了研究。此外，他作曲直到晚年。他是一位杰出的钢琴家，显然他更愿意在他的实验室雇用会演奏一些乐器的科学家。当他九十多岁仍然从事职业活动时，有人问他长寿的秘诀，他回答说最重要的是游泳和适量进食。希拉里·科普罗夫基于 2013 年在美国逝世。

## Hilary Koprowski (1916 - 2013)

**It's interesting that according to the stereotype, scientists are dull and spend their lives almost entirely in the laboratory. In reality, their life stories are complex and full of surprising twists and turns. A prime example is Hilary Koprowski, the man who created a vaccine against polio, which causes polio disease.**

In 1992, Rolling Stone magazine published an article whose author claimed that Hilary Koprowski, a world-class virologist and immunologist, was responsible for the development of the AIDS epidemic in Africa. The production of vaccines against the poliovirus was supposedly based on the biological material of chimpanzees that carried HIV. By administering the vaccine to humans, the virus was supposed to enter the human body. The Rolling Stone is not a science magazine but a music magazine. Yet, the information quickly spread around the world. It was quickly proven to be false, but it didn't matter much. There was even a documentary film made in France called *Has the world gone mad? Where did AIDS come from?* By then, it was clear that Koprowski's vaccine had nothing to do with AIDS. In Nature and Science, three independent teams of scientists published papers that confirmed this. Nevertheless, to this day, you can still find claims that vaccines caused AIDS.

## Vaccine

Hilary Koprowski was born in 1916 in Warsaw. Although he graduated from the Warsaw Medical University, he wanted to dedicate himself to music. He also graduated from the music conservatory, and just before the war, he went to Rome for further music studies. Next, he sailed to Brazil, where he made a living by giving piano lessons and concerts. His life changed after a coincidental meeting on a beach in Rio De Janeiro. He saw a friend with whom he had studied medicine in Poland. He convinced him to take up science. His arguments must have been strong because soon, Koprowski moved to the USA and started working in a laboratory. At first, he researched rats. These animals infected with the poliovirus did not show any symptoms of poliomyelitis. Koprowski took sections of brain tissue from infected animals and then, after appropriate processing, injected them into other rats. He repeated this procedure many times to finally isolate a relatively weakened poliovirus.

An effective vaccine against the poliovirus was developed in 1950. The first large-scale vaccination occurred a few years later in the Congo. More than 200,000 children were vaccinated within a few weeks. The vaccine was convenient because it was administered orally. When mass vaccinations were taking place in Congo, an epidemic of this disease broke out in Poland. Since the beginning of the 1950s, more and more children had fallen ill with polio. At the end of the 1950s, the scale of annual infections amounted to six thousand cases. Koprowski, already a big name in the virology and immunology world, obtained nine million doses of the vaccine from the company producing it and sent them to Poland for free. In the first year after the vaccine was administered, the number of new polio cases dropped from 6,000 to 1,000, and two years later to a few dozen cases. At the same time, child fatalities dropped from several hundred cases to just two.

## **Disease**

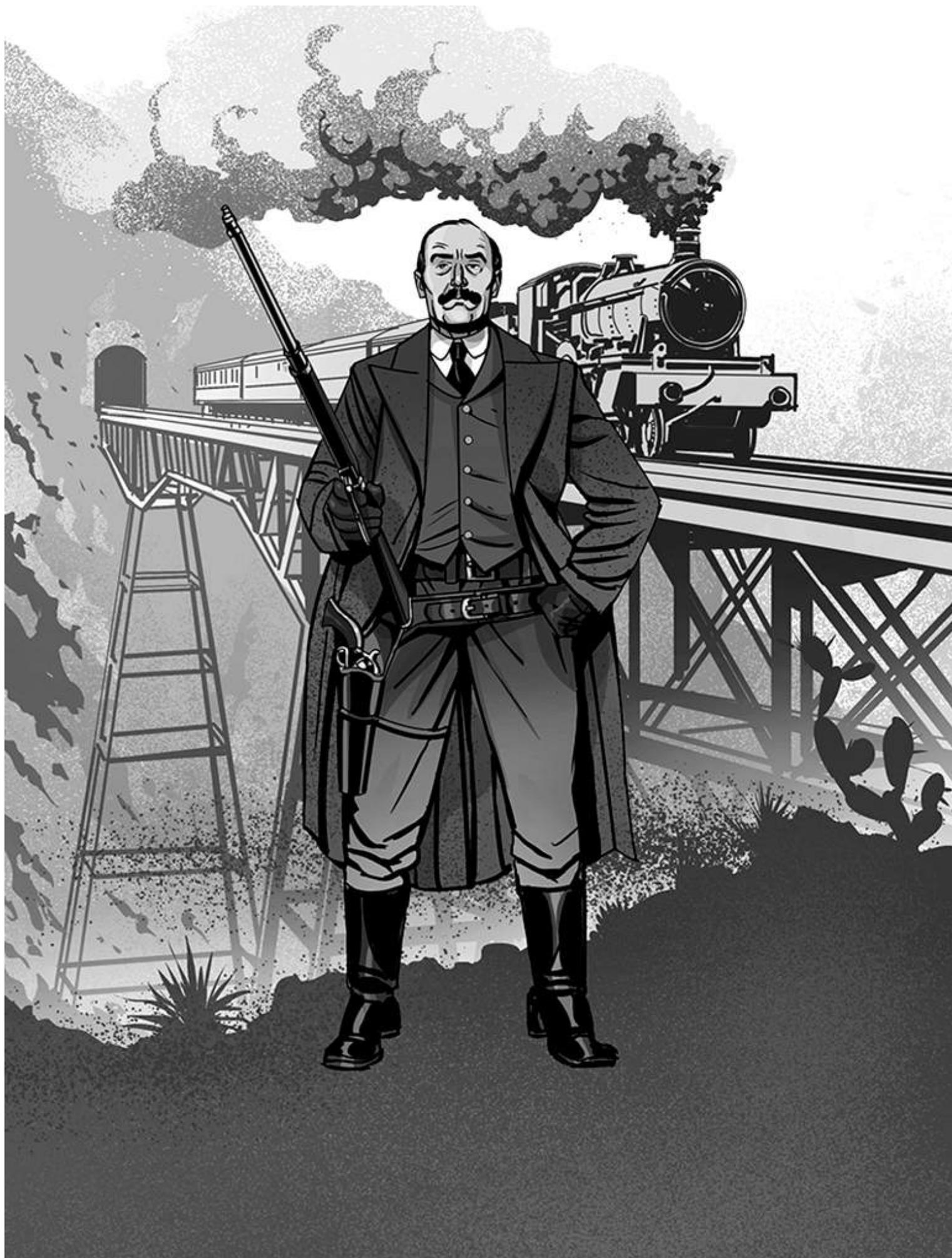
The poliovirus causes inflammation of the so-called anterior horns of the spinal cord. The disease was described independently by two researchers, Jakob Heine and Karl Medin. Hence the name Heine-Medin disease. The virus usually enters the body through food. Usually when a child drinks dirty water, for example, while swimming in a lake or pool. Receptors for the virus are present in many different cells. Still, the virus is particularly keen to attack cells in the nervous system, specifically cells in the spinal cord. That causes nerve paralysis and muscle flaccidity. People struck by the virus moved around on crutches or in wheelchairs. When the virus attacked the brain, it usually ended in the child's death. But it could also attack the respiratory muscles. The person in whom this occurred would suffocate because of the impossibility to catch a breath. The chest would stop working and the lungs would follow. In fact, the only way to prevent this from happening was to use the so-called "iron lungs" (chambers in which a child would stay and only the head would stick out). When the pressure inside the sealed chamber decreased, the air was sucked into the lungs through the minor patient's mouth and nose. Usually, the child spent several weeks in the iron lungs, but the cases of permanent paralysis still happened.

Before the invention of the vaccine, several hundred thousand children contracted polio each year. In rich countries, vaccinations began to be introduced in the late 1950s. Their effects, i.e., a rapid decrease in reported cases, appeared almost immediately. In African and Asian countries, regular vaccination began only in the early 1980s. The entire 1980s and early 1990s saw a rapid decline in the number of infections. However, it was not Koprowski's vaccine that was used, but an improved vaccine by Albert Sabin, a Pole born in Białystok and, like Koprowski, working in the USA.

## **Human**

Today, individual cases of the disease are recorded worldwide. Officially, Europe has been free of poliovirus since 2001. Thanks to the vaccine sent by Hilary Koprowski, Poland was one of the first countries in Europe where polio was not present.

Hilary Koprowski directed the Institute of Biotechnology and Advanced Molecular Medicine and the Center for Neurovirology at Thomas Jefferson University in Philadelphia almost until his death. He also established a foundation that helped young Polish scientists. Koprowski authored more than 850 scientific papers and contributed to the development of vaccines for rabies and fever. He conducted research on cancer, multiple sclerosis, and the impact of GMOs on living organisms. He continued to compose until his old age. He was an excellent pianist and reportedly more likely to employ scientists who could play some instruments. When he was asked about the recipe for long life in his nineties, he replied that the key things were swimming and moderation in eating. Hilary Koprowski died in 2013 in the USA.



埃内斯特·马里诺夫斯基 Ernest Malinowski (1818 – 1899)

在海拔近五千米的地方修建铁路放在今天也是一个难度不小的挑战，更别说在 19 世纪…当时这是世界上最伟大的工程成就。是一位波兰人——埃内斯特·马里诺夫斯基实现的。

出身贵族家庭，天资聪颖，就读名校。不过当一场反对分裂者的起义爆发时，他辍学投身战斗。参加十一月起义的人经常受到镇压，起义失败后，埃内斯特和他的家人不得不逃往巴黎。

在巴黎，马里诺夫斯基与他兄弟接受了非常全面的教育。不久之后，他们在法国路桥工程师团找到了一份工作。起初他们被派往阿尔及利亚。在非洲的法国殖民地修建道路的任务使埃内斯特认为是法国企业对政治移民的不信任。几个月后，他设法返回法国，开始修建隧道的工作——就在这段时间，他获得了扎实的经验。几年后埃内斯特的父亲逝世，而他的兄弟一直待在阿尔及利亚。马林诺夫斯基决定借此机会接受一份在秘鲁的工作合同，秘鲁当时是南美洲一个非常年轻的国家。与西班牙的独立斗争摧毁了一个战前已贫穷落后的国家。需要重建大量的基础设施。马里诺夫斯基这时已经在工程界中受到尊重，因此他被委托负责铺设新道路、建造桥梁、制作地图和其它建筑工程工作。

工程师—守护者

不幸的是，这个年轻的国家并没有长期享受自由。秘鲁西海岸拥有丰富的资源，包括硝石。西班牙人不想让这件宝物落入他人之手，因此在大陆上失败之后，决定从海洋再次进攻。当西班牙军舰停在秘鲁的主要港口卡亚俄时，局势似乎毫无希望。征服这座城市之后可以轻松地前往秘鲁的首都——利马。更糟糕的是，一名外国人被任命为港口防御总工程师。这位外国人就是…马里诺夫斯基。大多数居民不信任“gringo”【外国佬】（这是中美洲对老外的称呼）。并不是每个人都相信外国人有勇气和奉献精神为另一个国家甘冒生命危险。马里诺夫斯基记得他的祖国争取独立的斗争，所以他很容易陷入人们为捍卫自由而斗争的情绪中。埃内斯特使用了突发奇想将火炮设置在移动平台上，这样能够增加火力范围，并将敌人的主要火力引导到没有战略意义的防御点。西班牙人包围该城市七天，开火的时候工程师本人手里拿着武器站在防御墙上。尽管人员伤亡惨重，损失惨重，港口最终还是守住了，西班牙军舰从南美海岸驶离。

马里诺夫斯基成为了民族英雄并获得秘鲁荣誉市民称号。他赢得了人们的欢迎和极大的尊重。他时常用美味佳肴举办家庭招待会。他接待了许多来自不同科学和政治背景的客人。19 世纪的秘鲁政治上非常动荡，但不管谁统治着这个国家，马林诺夫斯基总是提供建议和帮助。他爱上了秘鲁共和国作为第二故乡，考虑到国家的未来，他向执政领导人主张发展基础设施。

深渊上的建设

在 19 世纪，推动国家发展的不是公路，而是铁路。运输能力的匮乏，特别是在面积大、地形复杂的国家，很容易划分成主要中心，即首都和“其余外围”。就秘鲁而言，这个问题甚至更大，因为在海岸与国家的东部之间有安第斯山脉——世界最高的山

脉之一。在如此高的山上建设铁路是否可行？许多工程师认为这是痴人说梦。埃内斯特·马里诺夫斯基持不同意见。设计之前这位工程师走遍了整个路线以进行必要的测量。这一切持续了八个月，因为马里诺夫斯基不得不带着测量设备爬到人迹罕至的安第斯山脉，爬到四千多米高的地方。安第斯没有道路，所以饮食、帐篷和仪器要么放在骡子背上，要么装在背包里。

马里诺夫斯基建造的项目被称为大胆的，甚至是有远见的。他所采用的工程解决方案都是世界创新的。秘鲁政府决定实施该项目，但需要大量的资金。资金来源是…鸟粪。鸟粪是 19 世纪流行的肥料。正好，秘鲁其中一个岛屿上有大量鸟粪资源。多年来，这些供应为国家提供了资金，并允许政府项目得以实施。

横贯安第斯铁路的建设始于 1870 年。埃内斯特·马里诺夫斯基当时 52 岁。为了穿越如此高的山脉，已经修建了 60 多条隧道。在某些地方，轨道被放置在岩石峭壁上。在铁轨无法转弯的地方，就在陡峭的斜坡上蜿蜒曲折。在其他地方，在山谷之上，建造了几十座桥梁。当地工人无法在悬崖上悬挂在绳索上工作时，水手就被雇佣来建造桥梁，对他们来说在摇摇晃晃的桅杆上工作不是问题。位于 Verrugas 最高的桥梁高 77 m，长约 200 米。马里诺夫斯基亲自下到每个山谷和深渊，无法徒步下去时，他就被绳索拽着下降。嗯—他必须亲自检查一切。

当秘鲁爆发经济危机时，马里诺夫斯基把自己的钱投入到铁路修建中。他非常渴望铁路能作为他对这个新的家乡的一份礼物。工程开工二十年后于 1890 年竣工。安地斯铁路的最高点—海拔 4818 公尺处位于蒂克里奥山口。直到 2005 年，这一直是世界上海拔最高的铁路线。

## **Ernest Malinowski (1818 - 1899)**

**Building a railroad at an altitude of almost five thousand meters is not an easy task today, let alone in the 19th century. Back then, it was the most outstanding engineering achievement in the world. Its author was a Polish engineer, Ernest Malinowski.**

He was born in a noble family. Since he was very talented, he attended reputable schools. However, when another uprising against the countries that invaded Poland broke out, he dropped out of school and went off to fight. People who took part in the November Uprising experienced repercussions, so after the fall of the Uprising, Ernest and part of his family had to flee to Paris.

In Paris, Malinowski and his brother received a comprehensive education. Soon after, they got a job in the French Corps of Engineers for Roads and Bridges. At first, they were sent to Algeria, conquered by France. Ernest thought that his supervisors sent him to the French colony because they lacked trust towards a political expatriate. After a few months, he returned to France and was hired to build canals - it was then that he gained profound experience. A few years later, Ernest's father died, but his brother was still in Algeria. Malinowski decided to take advantage of the opportunity and accepted a few years contract in Peru, then a very young country in South America. The fight for independence from Spain had ruined the country, which was poor and underdeveloped even before the war. It needed new infrastructure and complete reconstruction. Malinowski was already highly respected in the community, so he was entrusted with marking new roads, building bridges, making maps, and supervising various construction works.

### **Engineer-Defender**

Unfortunately, the young country did not enjoy freedom for long — the western coast of Peru was rich in natural resources, including saltpeter. The Spanish did not want to let this treasure out of their hands. Since they had already lost the battles on the land, they decided to attack from the sea. When the Spanish ships arrived at Callao, Peru's main port, the cause seemed lost. Capturing the city meant easy access to the capital, Lima. The situation was even worse as the chief engineer for the defense of the port was a foreigner. It was none other than Malinowski. Most inhabitants did not trust the "gringo" (that is how the newcomers are called in Central America). Not everyone believed that someone would have the courage and dedication to risk his life for another country. Malinowski, however, well remembered his homeland and the struggle for independence, so it was easy for him to empathize with the people defending their recently regained freedom. Ernest used an innovative idea of placing the cannons on mobile platforms, which allowed for a very long range of fire and directed the enemy's primary attack to the less strategic defense points. When the Spaniards began firing seven days after surrounding the city, the engineer himself, with guns in hand, stood on the defensive walls. Despite many casualties and great destruction, the port defended itself, and the Spanish army sailed away from the South American shores for good.

Malinowski became a national hero and became an honorary citizen of Peru. He was famous and respected by the people. His house was always open, and his cooking was supposedly delicious. He welcomed many guests from different scientific and political backgrounds. The 19th century was very turbulent for Peru politically, but Malinowski was always there to give advice and help no matter who ruled the country. He loved the Peruvian Republic and treated

it as a second homeland. Thinking about the country's future, he urged those in power to expand the country's infrastructure.

### **Building Over the Precipice**

In the nineteenth century, it was not the construction of highways but railroads that enabled countries to develop. The lack of transportation, especially for countries with large areas and difficult terrain, meant they were divided into the main center, capital, and "all the rest." In Peru, this problem intensified as the Andes lay between the coast and the east part of the country. The Andes are one of the highest mountain ranges in the world. Could a railroad even be built in such high mountains? Many engineers considered it to be completely impossible. Ernest Malinowski, however, was of a different opinion. Before creating the project, the engineer traveled the entire route in order to make the necessary measurements. All this took eight months because Malinowski had to climb with the measuring equipment into the inaccessible Andes at over four thousand meters. There were no roads in the Andes, so people carried provisions, tents, and equipment on the backs of mules or in backpacks.

Malinowski's project has been called daring, even visionary. The technical and engineering solutions he proposed were innovative on a global scale. The government decided to implement it but needed vast amounts of money. The salvation turned out to be bird excrement, i.e., guano, which in the 19th century served as a popular fertilizer. It so happened that Peru had a massive supply of guano on one of its islands, the sale of which supplied the state coffers and allowed the implementation of government projects.

Construction of the trans-Andean railroad began in 1870. Ernest Malinowski was 52 years old at the time. More than 60 tunnels were dug to get through such high mountains. In some places, the tracks were laid on rock ledges. Where the tracks could not turn, they were led in zigzags down steep slopes. In other places, over valleys, dozens of bridges were thrown. Sailors, used to working on shaky masts, were hired when it became apparent that the local workers could not work suspended on ropes over the abysses. The highest of the bridges at Verrugas was 77 m high and about 200 m long. Malinowski descended into every valley and chasm by himself, and when this was not possible, he was lowered on a rope. Well - he had to check everything himself.

When Peru's economic crisis broke out, Malinowski contributed his own money to finish the railroad line. He wanted the railroad to be a gift to his new homeland. Construction was completed twenty years after it began, in 1890. The highest point of the Transandine Railway is at Ticlio Pass at 4818 m above sea level, and until 2005 it was the highest railroad in the world.



约翰·赫维留斯 Jan Heweliusz (1611-1687)

约翰·赫维留斯是 17 世纪的欧洲最杰出的学者之一。受到来自当时发展繁荣的英国和法国学术界的赞赏，他得到了极大的认可。他的研究启发了其他学者的工作，并把他的优秀作品视为典范。市议会议员、酿酒师、建造师兼科学家。虽然他从事了很多不同领域的工作，但都保持同样一丝不苟的态度。

约翰·赫维留斯出生于格但斯克一个啤酒酿造商家庭，是亚伯拉罕和科尔杜拉赫克的长子。尽管他的姓氏有很多变体，但他最喜欢拉丁化形式的赫维留斯。从大学起官方使用约翰·赫维留斯这个名字。上大学之前他接受过格但斯克学术性体育馆教授的教育。他成为科学家的道路并不平坦。等待着他的责任最终帮助他成为了世界历史上最著名的天文观察者之一。

1630 年在荷兰莱顿学习法律和经济。这些专业会帮助他在格但斯克经营家族企业。不过他对这些学科并没有特别感兴趣，因此大约一年后就退学了。由于当地大学的天文学教授水平不高，约翰决定在欧洲进行一次科学之旅。在此期间，他尽可能地利用机会观察天空。他在伦敦逗留了一段时间，然后搬到法国。在那里他遇见了许多著名的科学家。他也想去意大利，但由于父亲的病而回国。必须有人经营家族企业。遵循家族传统，约翰在啤酒厂工作并成为啤酒商行会的成员。他的啤酒厂酿造了名为 *Jopenbier* 的烈性波特啤酒，是欧洲最好的啤酒之一。与此同时，他还担任过各种政府公职。他管理圣凯瑟琳教堂并成为陪审员。他还作为一名市议会议员和处理几个公会事务的督察员。另外，他还是老城的法官。

终于，天文学！

又过了一段时间后，他开始认真对待天文学。这还是应他在格但斯克上学时最喜欢的老师的要求。这位老师叫彼得·克鲁格（Peter Crüger），他临终前要求约翰重新观察天空。第一个任务是观察即将到来的日食。老师的话很有预见性。赫维留斯没有后悔自己的决定，并且他的选择不仅为他带来了名气，也使他的家乡出名。

从事这项新职业并不容易。探索天空的奥秘需要合适的仪器与空间。赫维留斯家族企业提供了帮助。研究所需的资金来自两家啤酒厂。

1640 年，他建立了第一个天文台。位于他公寓的阁楼上，被称为 *Stellaeburgum*，即星座或星辰花园。赫维留斯早先获得的玻璃加工和机械技术这时派上了用场。约翰亲自精确研磨镜头并制造了望远镜。天文台上也有他手工制作的六分仪和八分仪——用以观察天体高度和确定星星的位置象限仪。1650 年，他完成了占地 140 平方米、新的天文台的建设。当时，这是世界上同类设施中最现代化的。不幸的是，由于一场事故，天文台发生了火灾。除此之外，图书馆、印刷厂以及约翰用来绘画他书中插图的车间都被烧毁。时年 68 岁的赫维留斯有强大的支持者，因此立即开始重建。这要归功于波兰国王扬三世索别斯基（Jan III Sobieski）的支持，他为他的啤酒厂免税并给赫维留斯提供了年薪。

绘画天赋

在他的作品中几乎所有的插图都是他自己亲手绘制的，因为绘画也是他的众多才能之一。他写了几本书，但名气最大，最获认可的主要是月学，即对月球的描述。他撰写了几本书，但名为《月图》（*Selenographia sive Lunae Descriptio*）的著作给他带来了最大的名气和认可。当时，这是对我们地球的这颗卫星进行的最好、最详细的科学研究。科学界对该作品观点的认可持续了接下来的 100 年。里面对月球表面的描述附有三张地图，显然是赫维留斯绘制的。约翰展示了月亮的运动和月相。一些观察结果非常令人惊讶，例如月亮有点“摇晃”（这个现象后来艾萨克·牛顿详细解释过）。有些页面还充满了关于木星卫星的注释，以及对太阳黑子和行星的观察结论。由 40 幅图纸补充了文本，也是赫维留斯制作的。此外，约翰也进行了彗星的描述，并发现了其中的一些。他在另一部名为《彗星图》（*Cometographia*）的作品中总结了对大约 400 个彗星的知识。他用 406 幅插图丰富了彗星的外貌。在那个年代他是第一个相信彗星以弧线运动的人。其他天文学家声称彗星以直线运动。是赫维留斯说得对。不过他声称一像当时的其他彗星研究人员一样一彗星来自天体的烟雾是错的。另一部伟大的作品是两卷本的《天文仪器》（*Machina coelestis*），其中描述了天文学的历史，同时也总结了他自己对天空的 2 万次观察。赫维留斯去世前未能出版他最伟大的作品。后由他的第二任妻子伊丽莎白出版的《天文导览》（*Prodromus astronomiae*）星表，内容包含 1564 颗星体。赫维留斯也想发表与来自欧洲各地的科学家和统治者的往来通信。信函的数量达到 3 千封。每一封都仔细收集，并誊写了自己寄出的信。最后自己没有来得及出版，他的继承人也没有做到。

约翰·赫维留斯非常细致。不仅是在他为望远镜磨眼镜或建造测量设备时。不仅在他绘制地图和绘图时，尤其是在他做测量时。通过添加他的科学拼图，填补了科学界没有他会长期空置的领域。

## **Johannes Hevelius**

### **Jan Heweliusz (1611-1687)**

**Johannes Hevelius, known in Poland as Jan Heweliusz, was one of the most outstanding scholars in 17th century Europe. Scholars from the most prominent scientific circles of England and France recognized his achievements. They found him inspiring - both in terms of the subject matter and his scholarly assiduousness. He was a city councilor, brewer, constructor, and scientist. He focused on many fields, but he was always diligent.**

Johannes Hevelius was born in Gdańsk in a family of brewers and merchants, as the eldest son of Abraham and Cordula née Hecker. Despite the many variants of his name, he liked most the Latinized form - Hevelius, which he used since his studies, along with the first name Johannes. Before entering university, Hevelius received education from professors at the academic gymnasium located in his hometown. The road he had to take to become an academic was not an easy one. Other responsibilities awaited him, which eventually helped him become one of the most famous sky observers in the history of the world.

In 1630, he went to Holland, to the city of Leiden, to study law and economics. These majors were supposed to help him run the family business in Gdańsk. However, these disciplines did not particularly interest him, and after about a year, he resigned. Since the local university did not teach astronomy at a high level, Johannes decided to go on a scientific trip around Europe. He seized the opportunity to conduct sky observations wherever he could. After staying in London for some time, he moved to France to meet many famous scientists. He also wanted to go to Italy, but his father's illness forced him to return home. Someone had to run the family business. Keeping with family traditions, Johannes worked in a brewery and became a member of the brewers' guild. His brewery made a strong beer called Jopenbier, which was considered one of the best in Europe. The brewery was not his only workplace, as he also held various public offices. He administered St. Catherine's Church, became a juror, served as a councilor and inspector dealing with matters of several guilds. He also held the office of the judge of the Old Town.

### **Finally, astronomy!**

It took some time before he became seriously interested in astronomy. It was at the request of his favorite teacher, who was still at school in Gdańsk. On his deathbed, Piotr Krüger asked Johannes to return to observing the sky. The first task was to observe an upcoming solar eclipse. The teacher's words were prophetic. Hevelius did not regret his decision, and his choice brought fame not only to him but also to his hometown.

His new profession was not easy, however. Discovering the secrets of the sky required instruments and unique rooms adapted for this purpose. The family business helped Hevelius. The funds needed for the investment came from the production of beer in two breweries.

He founded the first astronomical observatory in 1640 - it was located in the attic of his tenement house. He called it Stellaeburgum, which means the Constellation or the Star Garden. In equipping it, Hevelius' glassworking and mechanic skills he had acquired earlier came in handy. Johannes himself made telescopes, for which he precisely ground the lenses. In addition, he constructed a sextant and an octant - instruments measuring the height of celestial bodies

above the horizon and a quadrant determining the position of stars. In 1650, he completed the construction of a new 140 sq.m. observatory. It was then the most modern object of its kind in the world. Unfortunately, as a result of an unfortunate accident, a fire broke out in the observatory and burnt the library, the printing shop, and the workshop where Johannes created illustrations for his books. Hevelius, who was 68 years old at that time, had a strong supporter and immediately began the reconstruction works. It was possible thanks to the Polish King John III Sobieski, who exempted his breweries from tax and offered him an annual salary.

### **Talent for drawing**

Johannes illustrated all of his works himself, for drawing was one of his many talents. He wrote several books, but *Selenography* that described the Moon brought him the greatest fame and recognition. At that time, it was the best and most detailed scientific study of our satellite. For the next 100 years, no one managed to do it more precisely. Three maps drawn by Hevelius accompanied the description of the Moon's surface. Johannes depicted the movement of the Moon and its phases. Some observations were quite surprising - the Moon "wobbles" a little (this phenomenon was explained in detail only by Isaac Newton). The book also included information about the moons of Jupiter and conclusions from observations of sunspots and planets. There were more than 40 drawings, also made by Hevelius.

Johannes also attempted to describe comets as he discovered several of them. He described 400 of them in another work entitled *Cometography*. Four hundred six drawings illustrated the history of their appearance. At that time, he was the first to believe that comets move in an arc. Other astronomers claimed that they move in straight lines. It turned out that it was Hevelius who was right. However, he was wrong when he claimed - as did other comet researchers of the time - that they arise from the fumes of celestial bodies. His subsequent great work was the two-volume *Celestial Machina*. He described the history of astronomy and summarized 20 thousand of his observations of the sky. Hevelius did not manage to publish his most excellent work before his death. It was done only by his second wife, Elizabetha. It is the *Annunciation of Astronomy*, a large atlas describing over 1500 stars. Hevelius also wanted to publish the correspondence he had with scientists and rulers from all over Europe. The number of letters reached 3 thousand. He meticulously collected all of them and had them transcribed. However, they have never been published either by him or his heirs.

Johannes Hevelius was very precise. Not only when he was grinding glasses for his telescopes or building measuring devices. Not only when he drew maps and made drawings, but above all when he made calculations. By adding his scientific bricks, he filled in places that would have remained empty for a long time.



玛丽亚·查普利茨卡 Maria Czaplicka (1886 – 1921)

她的生活与她研究领域一样动荡而异常。她研究了神灵崇拜和萨满教的人。她旅行、拍照、写书、学习风俗和语言。它拉近了世界的距离，对于“西方人”来说，这不仅是抽象的，而且是神奇的。她出生于华沙，由于获得了奖学金就前往英国留学。首先在伦敦，然后在牛津，她学习了地理和人类学。正是在那里她获得的奖学金帮助她完成了首次西伯利亚的旅行。她懂俄语这一定很有帮助。此次旅行后，她写了第一本广受欢迎的书。由于语言表达简单并且吸引人的话题而获得了人气。以前没有对西伯利亚人的研究，尤其是没有被能够理解他们的人研究过。在第一次远征之后，又有第二次远征西伯利亚的机会。第二次探险队的一些成员提前返回，无法承受极端的天气条件和旅途的艰辛。但玛丽亚·查普利茨卡继续了她的研究。她从旅途中带回来了很多笔记和数百张照片。她研究了习俗，也研究过当地人本身。看过她从第二次西伯利亚探险中带来的材料后，她被邀请一作为历史上第一位女性一担任牛津大学人类系的系主任。她的研究领域包括了东欧与西伯利亚，但她主要对萨满教和精神崇拜感兴趣。她从习俗和传说，以及心理学和社会学的角度探讨了这个话题。

她从事科学工作并支持波兰的独立组织。她成为英国皇家地理学会和皇家人类学会会员的首批女性之一。她收到了在多所世界大学讲学的邀请，多次获得奖学金并获得许多奖项。然而她很难找到一份固定的工作。并不是因为能力不足，而是性别和性格古怪的关系。由于神经衰弱她在 35 岁时选择了自杀。在她的遗嘱中，她要求将她多次探险的所有笔记和纪念品交给亨利·霍尔（Henry Hall），一位朋友、同事和旅伴。

她有一个不安分的灵魂，是一个一直在寻找，无处可归的人。她争取妇女平权并支持波兰的独立。后来的确成为代表波兰的名人大使。作为名人，她撰写文章并受采访介绍了她的祖国。当西方媒体刊登对波兰不利的评论时，她通常会发出强烈的辩护声音。

首先一当她在华沙生活一在非正规的学校吸收知识，然后在国外的大学求学。她对书房和图书馆的工作感到厌烦。玛丽亚想在实践中获得知识，因此她长途跋涉到东方，去那些当时没人去过的地方。她进行采访，做观察笔记，拍照并收集展品。然后她在英国和美国的演讲厅展示了它们。当时她所说的、做的，就像是在分享另一个世界的经历。她写了很多，而她的书很受欢迎。是的，她的书写得很好，但最重要的是，其内容是真实而大胆的。

## **Maria Czaplicka (1886 – 1921)**

**Her life was as turbulent and unusual as the subjects she was interested in. She studied ghosts and shamans. She traveled, took pictures, wrote books, learned customs and languages. She brought to life a world that remained abstract and magical for "Western man."**

She was born in Warsaw, but she went to Great Britain to study thanks to a scholarship. First in London and then at Oxford, she studied geography and anthropology. There, she won a scholarship that enabled her to finance her first expedition to Siberia. It certainly helped that she spoke Russian fluently. After this expedition, she wrote her first book. It became very popular because of her simple language and its subject. The Siberian people had not been in the scope of interest before, certainly not by someone who could understand them. She decided to organize a second expedition to Siberia. Some members of the second expedition returned ahead of schedule, unable to withstand the extreme weather conditions and the journey's hardships. Maria Czaplicka, however, continued her efforts. She brought back many notes and hundreds of photos from her travels. She studied the customs, but also the people themselves. After compiling the materials she collected during the second Siberian expedition, she was offered to chair the Department of Anthropology at Oxford University as the first woman ever. She studied Eastern Europe and Siberia but was mainly interested in shamanism and the cult of spirits. She explored the subject from all perspectives: customs, legends, psychology, and sociology.

She conducted scientific work and supported organizations that fought for Polish independence. She was one of the female members of the British Royal Geographical Society and the Royal Anthropological Society. She received offers to lecture at several world universities and received several scholarships and awards. However, it was difficult for her to find a permanent job. It was not because of her incompetency but gender and eccentric behavior. As a result of a nervous breakdown, she committed suicide at the age of 35. In her will, she wished that all her notes and souvenirs go to Henry Hall - her friend, colleague, and traveling companion.

She was a restless spirit, constantly searching and nowhere home. She fought for equal rights for women and supported Poland's quest for independence. Later she actually became an ambassador for Poland. As a well-known person, she wrote articles and gave interviews about her country of origin. When the western press made negative comments about Poland, she often spoke out strongly in its defense.

She was hungry for knowledge, first - while still living in Warsaw - at illegal schools, then at foreign universities. She was bored with working in the study room and library. Maria wanted to gain knowledge in practice, hence her long expeditions to the east, to places that no one visited then. She conducted interviews, took notes on her observations, photographed, and collected exhibits she later presented during her lectures in Great Britain or the USA. In those days, what Czaplicka described and showed seemed like sharing experiences from another world. She wrote a lot and her books were very popular. Yes, they were well written, but most of all, they were authentic and courageous.



亚切克·卡宾斯基 Jacek Karpiński  
(1927 – 2010)

他本可能成为波兰的比尔·盖茨或史蒂夫·乔布斯。只不过我们的发明家出生在错误的时间和地点。在共产主义的波兰，他无法发展自己的兴趣，不能指望接触到最新技术。他创建了世界上第一台晶体管计算机、感知器——一台可以识别周围环境的学习机和声控机器人。毫无疑问，他是一个有远见的人。他就是一个电脑人。

>>电脑

二战期间，他是“佐什卡”营的一名士兵。在占领期间他参与了“灰色等级”童军。他参加过童军地下活动，破坏行动以及突击组。像他这样的人在战后受到最不信任的对待，通常不允许他们发展。进入成年对他来说是非常残酷的。17岁那年，华沙起义的第二天他脊椎中弹。在塔特拉山中康复。于扎科帕内他需要重新学习走路。

战争结束后，他立即投入学习，先是在罗兹，然后是华沙。世界上第一台晶体管计算机 AKAT-1 是他最早发明之一。借助于该发明亚切克在联合国教科文组织世界青少年大赛中获得第一名。该设计非常具有创新性，以至于卡宾斯基收到了世界上最好的技术大学之一，MIT（麻省理工学院）的邀请。他收到了很多出国工作的邀请，但他想回到波兰。1962年，他与一位朋友一起创造了感知器，世界上第一台可以识别周围环境的学习机。感知器是一个简单的神经网络。卡宾斯基创造的是世界上第二座这类的网络。今日许多应用程序具有学习能力，例如在我们的智能手机中使用相机的适当软件能够识别环境元素。即使目前这也会引起人们的兴趣，而卡宾斯基 60 年前已建立了他的网络！不过，这还不是他最后的发明。1971 年他向世界展示了 K-202 个人电脑，不幸的是它从未被投入生产。这无疑是一项突破性的设计，是与希望将 K-202 投入生产的英国公司合作制造的。波兰共产党也有这样的意图，但都没有实现。卡宾斯基的计算机的参数比西方同类设备更好。

>>>政治

在接下来的几年里没有出现新的发明，以前的也没有被开发出来。波兰经济状况很糟糕。世界在前进，而我们却原地踏步。没有人记得那些多年前在世界上备受推崇的发明。潜力被白白浪费了。1978 年，卡宾斯基放弃了电子学和计算机，开始养猪。几年后，他前往瑞士，开始在录音机厂工作。又过了 10 年，他于 20 世纪 90 年代初回到波兰，并成为两位财政部长的 IT 顾问。

不少人说他吹嘘的发明并不是他自己的发明，而是整个团队的成就。有很多方法可以去验证这样的信息。百科全书中记载的许多名人都把一群人的工作归为己有。也有人窃取了别人的想法，然后，因为有钱，以自己的名义申请专利。亚切克·卡宾斯基的情况不是很清楚。缺少许多证明文件，而且他以前的同事提供了自相矛盾的信息。应该记住，卡宾斯基生活在一个共产主义国家。当时有远见的人经常受到压制，而平庸的人则被置于一个高位上。战争结束后，共产党人残酷地对待像卡宾斯基这样参与过波兰救国军的人。许多年轻人不能指望考上大学。许多人为了能够实现自我的价值，不得不同意与秘密工作或情报部门合作。亚切克·卡宾斯基必须做出哪些妥协？他合作是否为了制造计算机，还是因为合作而有更轻松的职业道路？我们不知道…

## >>人物

亚切克·卡宾斯基不容易相处。他十分骄傲，不仅不愿与客户分享计算机建设计划，也不愿与波兰委员会分享计算机建设计划以评估他的工作效果。他经常超出设定的预算，但他不断抱怨缺乏足够的资源和人员。尽管财务支出不断增加，但他的任何发明都无法开始生产。最终，政府暂停批准购买外国组件所需的美元。在卡宾斯基的团队工作 2 两，花费了数百万兹罗提之后，市场上仍然没有一台功能齐全的 K-202 计算机。由于各种纠纷，利益冲突和技术问题，计算机的生产被喊停。有人说它的参数被大大夸大了，有人说人类的嫉妒和国家的经济崩溃导致了大量人才的浪费。政治体制转移之后卡宾斯基继续为财务部长提供顾问。此外，他试图生产收银机，甚至他称为 Pen-Readers 的智能笔。但是这些设计要么不切实际，要么已过时。后来，亚切克以设计网站为生。他被授予英勇十字勋章、波兰复兴勋章指挥官十字勋章和波兰复兴勋章军官十字勋章。他于 2010 年在弗罗茨瓦夫逝世。

他是一个脾气不好的天才。虽然有远见，但由于各种原因他没能大获成功。今日很难理解他的选择，但在 20 世纪 60 年代或 70 年代，铁幕背后国家的现实与现在完全不同。遗憾的是卡宾斯基没有出生在另一个时代。也许硅谷就会在维斯瓦河边诞生？

## **Jacek Karpiński (1927 – 2010)**

**This man was called Polish Bill Gates or Steve Jobs. Only that our inventor was born in the wrong time and place. In communist Poland, he could not develop his passions and count on access to the latest technologies. He built, among others, the world's first transistor computer, a learning machine - the so-called perceptron and a voice-controlled robot. Without a doubt, he was a visionary. Simply put. He was a computer man.**

### **Computers**

During World War II, he was a soldier of the "Zoska" battalion. During the occupation, he belonged to the Grey Regiments. He participated in the scout conspiracy, took part in sabotage actions, and was a member of Assault Groups. After the war, such people were treated with tremendous distrust and usually were not allowed to spread their wings. His entrance into adulthood was ferocious. When he was 17, he was seriously shot in the spine on the second day of the Warsaw Uprising. He recovered in the Tatra Mountains. In Zakopane, he learned to walk again.

Immediately after the war, he started his studies, first in Lodz, then in Warsaw. One of his first inventions was the AKAT-1, the world's first transistor computer. Jacek won the first prize at the UNESCO world competition for the youth. The design was so innovative that Karpiński received an invitation from MIT (Massachusetts Institute of Technology), one of the best technical universities in the world. He had many job offers from international companies, but he wanted to return to Poland. Together with a colleague, in 1962, he constructed a perceptron - the first machine in the world that could learn and recognize the environment. A perceptron is a simple neural network. The one created by Karpiński was the second of its kind in the world. Today, algorithms of many applications possess learning capabilities, for example, in our smartphones. The appropriate software can recognize elements of the environment using a built-in camera. Of course, it arouses interest and emotions even today. Karpiński built his network 60 years ago! However, it was still not the end of his discoveries. In 1971, he showed the world the K-202 personal computer. Unfortunately, its production never started. It was undoubtedly a breakthrough design made in cooperation with British companies, which wanted to put the K-202 into production. Polish communists also had such an intention, but nothing came out of it. The computer had better parameters than devices of a similar class in the West.

### **Politics**

No new invention was created for the next few years, and previous ones were not developed. The Polish economy was in a terrible state. The world was moving forward, and Poland was standing still. The inventions that were admired all over the world years ago are no longer remembered. The potential was wasted. In 1978, Karpiński gave up electronics and computers to start raising pigs. After a few more years, he went to Switzerland and worked at a tape recorder factory. He returned to Poland after another 10 years, in the early 1990s, and became an IT advisor to two finance ministers.

Many people claim that the inventions he bragged about were not his work but the work of the whole team. This information can be looked at in different ways. Many famous people described

in encyclopedias attributed the results of a large group of employees to themselves. Some stole ideas and then, with money, filed patents under their own name. It is not entirely clear what the case of Jacek Karpiński was. Many documents are missing. His former colleagues give contradictory information. One should also remember that Karpiński lived in a communist country, where visionaries were often suppressed, and mediocrities were elevated to pedestals.

After the war, the Communists brutally cracked down on people who, like Karpiński, had belonged to the Home Army. Many young people could not count on being admitted to the university. To fulfill their hunger for knowledge and deepen their passions, many had to cooperate with the secret services or intelligence. What compromises did Jacek Karpiński have to make? Did he cooperate to build computers? Did he have an easier career path because he collaborated? We will never know...

## **Human**

Jacek Karpiński was not easy to work with. He had a huge ego and was reluctant to share his computer design plans with his clients and the Polish committees that were to evaluate the results of his work. He notoriously exceeded his budget; yet, he constantly complained about the lack of sufficient funds and people to work with. None of his inventions could be put into production despite constantly increasing financial outlays. Finally, the approval to purchase foreign components with American dollars was withheld. After Karpiński's team had worked for two years and spent millions of zlotys, there was still no single fully functioning K-202 computer on the market. As a result of various disputes, conflicts of interest, and technical problems, the production of the computer was discontinued. Some people said that its parameters were greatly exaggerated. In contrast, others said that human envy and the country's economic collapse wasted a great talent. After the political system changed, Karpiński continued to advise finance ministers and tried to produce cash registers and even intelligent pens, which he called Pen-Readers. However, these designs turned out to be either impractical or obsolete. Later Jacek made a living by designing websites. He was awarded the Cross of Valour, the Commander's Cross of the Order of Polonia Restituta, and the Officer's Cross of the Order of Polonia Restituta. He died in 2010 in Wrocław. He was a genius with a problematic character. Someone who had a vision but, for various reasons, suffered business failures. Today it is difficult to understand his choices mainly because the reality of a country behind the Iron Curtain in the 1960s and 70s was different than now. One can only regret that Karpiński was not born in other times. Who knows, maybe Silicon Valley would have been located in Poland?



## 索菲亚·凯兰-亚沃罗夫斯卡 Zofia Kielan-Jaworowska (1925-2015)

索菲亚·凯兰-亚沃罗夫斯卡是许多已灭绝物种奥秘的发现者，其中包括那些我们遥远的祖先。为了表彰她的功绩，许多学者用她的名字或姓氏命名新发现的动物化石。她最大的科学成就是赴蒙古生物考察活动。索菲亚·凯兰-亚沃罗夫斯卡拥有丰富的知识和科学直觉，此外，她还是一位了不起的组织者。

### 秘密学校

她于 1925 年出生于马佐夫舍地区，在她 10 岁时她的家人搬到了华沙。索菲亚·凯兰（结婚后改性成凯兰-亚沃罗夫斯卡）的学龄期恰逢第二次世界大战。侵略者关闭了学校，但包括索菲亚在内的许多孩子，在秘密学校学习过。1943 年，在位于若利博日区的中学，索菲亚获得了她的高中文凭，并立即一在华沙大学的秘密课堂上一开始学习动物学。在华沙起义期间她参与了“灰色等级”童军，作为一名护士，她背包里经常背着一本动物学书籍参加独立战斗。起义失败后她逃离了首都。解放后回到家中发现父母的公寓被彻底毁坏，无法居住。她在战争期间练习的动物学博物馆成为她的新家。由于在这里可以无限制地参观展品和阅读书籍，她决定将自己的一生奉献给古生物学，更确切地说是研究已灭绝的脊椎动物。

### 最伟大的远征

大学恢复后，她得到了一位杰出的科学家罗曼·科兹洛夫斯基教授（Roman Kozłowski）的照顾。然而，她没有研究波兰少见的脊椎动物化石，而是对三叶虫——一种已灭绝的海洋节肢动物展开了研究。她首先在圣十字山脉，然后在斯堪的纳维亚和捷克斯洛伐克进行考察。接下来的几年她致力于研究虫颚化石——化石环节动物的颌骨。她用创新的方法描述了它们从奥陶纪（大约 4.8 亿年前开始的）一直到现代的演变方式。随着 1963 年至 1971 年的蒙古戈壁沙漠探险，她开始了对哺乳动物化石研究的梦想。这名研究员是一个不简单的组织者，安排好各种设备，为几十人提供粮食，甚至从斯塔拉霍维采工厂免费租用了三辆卡车。最关键的是，她召集了最优秀的探险队的成员——总共约 30 个人。

探险期间的发现在轰动了世界。他们收集了大量爬行动物和哺乳动物。发现了许多远古时代的动物——隐藏在岩石中的海龟、鸟类和鳄鱼。还有恐龙，其中包括世界上唯一在战斗中纠缠在一起的标本——食草动物（原角龙）与捕食者（迅猛龙）。由于中生代哺乳动物很少被发现（因此也最不为人所知），此次探险的重点是寻找它们。1971 年探险结束时，统计了 180 个属于中生代哺乳动物的头骨。有些与其他骨骼结构的元素一起保存。这是世界上最大的中生代哺乳动物头骨收藏。其中有多瘤齿兽目——已灭绝的食草动物——对它们的研究工作使这群科学家们享誉国际。研究材料在作者的编辑下以当时最快的节奏出版。她鼓励着她的同事撰写，并为出版 10 卷英文系列丛书《波兰-蒙古古生物学考察结果》做出了贡献。成果也发表在许多国际期刊上，包括《自然》等著名科学期刊。

索菲亚·凯兰-亚沃罗夫斯卡十分认真。她本人亲自进行了大部分的研究，如有必要，她会邀请特定领域最优秀的专家进行合作。随着时间的推移，她在康斯坦钦的房子成为各种国际项目的指挥中心。

## 书籍、展览与奖项

索菲亚·凯兰-亚沃罗夫斯卡的第一个突破性发现是鉴定所谓的袋骨，例如在今天的有袋动物中发现的那样。此外，通过检查这些哺乳动物化石的融合骨骼以及小动物出生的开口的宽度，她得出结论：它们一定是胎生的，并且出生得很早。她花了三个月时间每天艰苦工作 10 个小时制造了这些原始哺乳动物的大脑模型。该模型清楚地显示了神经和血管以及大嗅叶。模型计算出的智力表明化石中的哺乳动物是聪明的。此外，她在多瘤齿兽目中发现了一块类似于鸭嘴兽的骨头。由于在这些现代哺乳动物中该骨头与产生毒液的腺体有关，因此她得出结论是早期哺乳动物也是有毒的。

她总结了她的研究并发表在关于中生代哺乳动物的两个版本的纲要（她共同创作的）中。鉴于第二版共 630 页的《恐龙时代的哺乳动物》的出版，波兰科学基金会授予了她有着波兰诺贝尔奖美誉的奖项。这位研究员不仅能够向科学家解释她正在研究的世界的秘密，也会向对该主题感兴趣的非专业人士解释。她出版了几本科普书籍，并组织了展览。在奥斯陆大学工作期间在她管理的博物馆重新安排了一个被忽视的古生物学展览。此外，她在波兰设计了许多展览，包括《来自戈壁沙漠的恐龙》和《陆地上的进化》，都在华沙的科学文化宫展示。第二个展览至今仍在进行着。

索菲亚·凯兰-亚沃罗夫斯卡教授探索了生活在遥远的中生代哺乳动物。有一次她被问到为什么选择这个研究领域，她回答说这是我们历史的开始。她一生都围绕着这个谜题。该研究员的组织能力转化为成了开创性的研究成果、精心挑选的合作者、创作展览和编辑书籍。她生活中最大的科学成就—赴蒙古古生物考察活动—产生了新的研究方向。在研究过程中发现的标本被各种科学家分析过，并且仍在被年轻一代的古生物学家研究。为了表彰她的功绩，世界各地的研究人员以她的名字命名了数十种化石动物。Kielanodont、Zofiabaatar 和 Zofiagale 这些已灭绝动物名字就是这样产生的。

## **Zofia Kielan-Jaworowska (1925-2015)**

**Zofia Kielan-Jaworowska is the discoverer of many mysteries of long-extinct species, including those that were our distant ancestors. In recognition of her merits, many scientists named newly discovered fossil using either her name or her surname. Her most tremendous scientific success was a paleontological expedition to Mongolia. Zofia Kielan-Jaworowska had excellent knowledge and scientific intuition.**

### **The Clandestine School**

She was born in 1925 in the central region of Poland called Mazowsze. Her family moved to Warsaw when she was 10. World War II broke when Zofia Kielan (after marriage known as Kielan-Jaworowska) was supposed to enter grammar school. The occupiers closed the schools, but many children, including Zofia, enrolled in clandestine classes. In 1943, Zofia passed her final exams in one of the schools located in Żoliborz. She immediately began studying zoology at the secret lectures at Warsaw University. During the Warsaw Uprising, she belonged to the Gray Ranks, the underground paramilitary Polish Scouting Association. She helped in the fight for independence as a nurse, keeping a zoology book in her backpack. After the fall of the uprising, she managed to get out of the capital. When she returned home after the liberation, her parents' apartment was completely destroyed and uninhabitable. The Museum of Zoology, where she served her apprenticeship during the war, became her home. With unlimited access to exhibits and books, she decided to dedicate her life to paleontology, specifically to extinct vertebrates.

### **The Largest Expedition**

When the university reopened, Kielan-Jaworowska came under the influence of an outstanding scientist, Professor Roman Kozłowski. However, instead of fossil vertebrates, which were scarce in the Polish lands, she focused on trilobites - extinct marine arthropods. She conducted her research first in the Świętokrzyskie Mountains, then in Scandinavia and Czechoslovakia. A few years later, she devoted herself to studying scolecodonts, i.e., the jaw of a polychaete annelid. Using innovative methods, she described their evolution from the Ordovician period (which began about 480 million years ago) to the present day.

Her dreams of studying fossil mammals came true thanks to the excavation expeditions into the Mongolian Gobi Desert in 1963-1971. Kielan Jaworowska was a great organizer - she took care of the equipment, bought provisions for several dozen people, and rented three trucks from the Starachowice factory for free. What was the most important, she gathered the right members of the expedition - about 30 people in total.

The discoveries made during the expeditions echoed around the world. The researchers gathered a great collection of reptiles and mammals and found numerous animals from distant times - turtles, birds, and crocodiles hidden in the rocks. They also found fossils of dinosaurs - among them was the world's only fossil of two "fighting dinosaurs" - a herbivore (Protoceratops) with a predator (Velociraptor). Since Mesozoic mammals were rarely found (and thus least known), the expedition mostly searched for them. At the end of the excavation expedition in 1971, the researchers had 180 skull specimens of Mesozoic mammals and many elements of other skeletal structures. That was the most extensive collection of Mesozoic mammal skulls in the world, and multituberculates, i.e., early herbivorous rodent-like forms, are abundant and well represented. Their discovery and study brought Kielan-Jaworowska

international fame. The compiled findings were published under her editorship at an express pace for those times. Together with her fellow scholars, she wrote ten volumes of the English-language series *Results of the Polish-Mongolian Paleontological Expeditions*. Many international journals, including such prestigious ones as *Nature*, also published their articles. Zofia Kielan-Jaworowska was very diligent. She did most of the research herself, and if necessary, invited the best specialists in the field to cooperate. Over time, her house in Konstancin became a command center for various international projects.

### **Books, Exhibitions, and Awards**

Zofia Kielan-Jaworowska's first breakthrough was identifying epipubic bones in multituberculates, similar to those of present-day marsupials. Moreover, by examining the fused bones of fossil mammals, as well as the width of the opening through which the young animal was born, she concluded that they must have been viviparous. Moreover, she concluded that they were born very early. The result of her unapologetically exacting work, to which she dedicated three months and 10 hours a day, was a brain model of these primitive mammals. The nerves, blood vessels, and olfactory lobe were clearly visible. The model used to calculate intelligence indicated that the fossil mammals were clever. In addition, Kielan-Jaworowska found that one bone of multituberculates is similar to those of platypus. Since it is associated with venom-producing glands in contemporary mammals, she concluded that early mammals must have also been venomous.

Kielan-Jaworowska summarized her research and published it in two editions of compendia on Mesozoic mammals. The second version of the 630-page book *Mammals From the Age Of Dinosaurs* was awarded the so-called Polish Nobel Prize, presented by the Foundation for Polish Science. The researcher was able to explain the mysteries of the world she studied to scientists and non-specialists interested in the subject. She published several popular science books and organized exhibitions. While working at the University of Oslo, she developed a new scenario and redesigned the neglected paleontological display in the museum. She also designed many exhibitions in Poland, e.g., *Dinosaurs from the Gobi Desert* and *Evolution on Land*. You can still visit the latter in the Palace of Culture and Science in Warsaw.

Professor Zofia Kielan-Jaworowska studied mammals living in the distant Mesozoic Era. Once asked why she picked them, she replied that they were the beginning of our history. She dedicated her entire life to putting this puzzle together. Her organizational skills translated into groundbreaking research, well-chosen collaborators, exciting exhibitions, and substantial contribution to the world of science. Expeditions to Mongolia were the most significant scientific success of her life, and they set in motion a new age of exploration. The specimens she had found were analyzed by various scholars and continue to be studied by the young generations of paleontologists. In recognition of her contributions, researchers worldwide have named dozens of fossil animal specimens after her. Thanks to Zofia Kielan-Jaworowska, we can now learn about Kielanodonta, Sophiabaatar, or Sophiagalea.



## 本尼迪克特·狄波夫斯基 Benedykt Dybowski (1833-1930)

本尼迪克特·狄波夫斯基一生中有一些爱。除了对他的家人之外，他还爱着祖国和科学。甚至在流放的艰难条件下他努力加深对科学的了解。在遥远的西伯利亚，他做出了人生中最伟大的发现。通过探索当时未知的自然，他展示了自己是一个心胸开阔的人。

本尼迪克特出生于 1833 年 4 月 33 日在今日的白俄罗斯领土上。他在一个有许多孩子的贵族家庭中成长，在他祖父的庄园里。初期他在家里受教育，家长、辅导老师及年长的哥哥姐姐都当过他的老师。就在那时他对自然产生了兴趣，建立了第一个他自己的植物标本馆和水族馆。他的青春期的爱情一直持续到他在多尔帕特大学学习医学，并在那里学习了动物学。经过三年的学习，他写出了一本被一众教授授予金奖的书：《关于利弗兰迪亚的淡水鱼》。尽管取得了这样的成功，他还是被大学开除，因为……他参与到了一场双人决斗中。所以他后来搬到了弗罗茨瓦夫，然后去了柏林。获得博士学位后，他才回到多尔帕特。

### 流亡

他对家乡的爱驱使他参加各种爱国社团活动。在学习期间他参与了爱国会，后来又参与了立陶宛国家组织。他认为民族的力量在于清醒。他与七位朋友一起成立了一个戒酒团体——“牛奶兄弟会”，他们坚决反对在波兰蔓延的酗酒现象。由于参加一次示威活动他无法担任雅盖隆大学动物学系主任。最终，他被聘为新近开设的华沙经济学院的助理教授。不过，当他参与一月起义组织时，他被捕了。入狱几个月后，他被判在遥远的西伯利亚苦役 12 年。当他和其他被驱逐者登上火车时，他的朋友送给他一台显微镜、急救箱和一套手术工具。狄波夫斯基梦想着旅行。他想去马达加斯加——在那里当医生的同时探索岛上鲜为人知的自然风光。情况并非如此，但这并没有让他崩溃。他决定在俄罗斯的深处实现自己的梦想。尤其是，人们对这些地区的自然状况知之甚少。

### 痴迷

狄波夫斯基总是尽量集中安排他的工作以便空出时间来收集研究标本。强迫劳动期间没有休闲时间。若未完成任务，流放者会受到严厉惩罚。狄波夫斯基却对所有的工作都有时间，甚至提供免费医疗服务。就这样，他赢得了当地人和当局的尊重。随着时间的推移，当局开始重视他的柏林文凭和他的科学工作的价值。因此本尼迪克特可以更自由地四处走动，并……收集新的标本进行研究（这甚至成为他的痴迷）。他全身心地投入到科学中，以至于他不关心自己的健康。他不止一次在光秃秃的地面上，在泥泞的河岸上过夜。他驾驶着一艘自制的小船航行，在这些穿越过程中，他经历了许多冒险，他的生命多次处于危险之中。他开着推车在水中静置了 12 个小时以至于研究人员丢失了一些有价值的笔记、衣服和书籍。他甚至睡在结冰的贝加尔湖水面上。为此，他建造了一个便携式的、有炉子加热的房子。这间小屋曾经被一阵风吹倒过一次。

十几年后，狄波夫斯基被允许回国……但他找不到工作。所以他再次返回到西伯利亚度过了五年。他说自己虽然“离开祖国”但却是“为祖国而出走”。为当时根本不存在的国家工作是他的主要动力。第二次在西伯利亚逗留期间他在堪察加半岛当上了医生。

他研究和收集了动植物标本，建立了麻风病医院，进行天花疫苗接种，并向当地居民传授了畜牧业和植物种植的知识。

## 认可

在狄波夫斯基的时代，俄罗斯科学家认为贝加尔湖的动物种群主要由鱼类组成。本尼迪克特认为这是不准确的。因为鱼吃什么呢？采用他自己设计的设备，他捕捞了许多软体动物、甲壳类动物、海绵和其它科学未知的动物。他还认识了新的鱼种和亚种，其中一些是地方性的，即只生活在贝加尔湖。收集的材料数量如此之多，以至于狄波夫斯基无法自己完成研究。初步预备后，把标本寄到了波兰。他的兄弟沃伊切赫给他提供了帮助。沃伊切赫是一名生物学家，曾在多帕特大学担任过一段时间的副教授。狄波夫斯基不仅要描述数百个新物种。通过深水测量，他表明贝加尔湖由两个盆地组成：被距离地表不超过 60 米的凸起隔成东西两部分。尽管他还研究了海洋动物以及动植物群（主要是鸟类），但由于对贝加尔湖的研究他获得了地理学会颁发的金奖。有人提议在他的姓氏后上加上“贝加爾斯基”的绰号，类似于征服新领土的将军的绰号。狄波夫斯基断然拒绝了，因为他不希望在波兰姓氏后有一个俄罗斯昵称。他发现的动物以他的名字命名，例如梅花鹿的新的亚种—满洲里梅花鹿（*Cervus nippon dybowskii*）。在第二次去西伯利亚远征期间，作为一个自由人，他还进行了人类学和民族志研究。他收集西伯利亚人民的衣物和日常用品。

狄波夫斯基出版了 350 多篇作品。其中不仅包括有关动物学、动物系统学或比较解剖学的科学论文，也有旅行日记。虽然他被流放苦寒之地，但在西伯利亚却实现了他一生所宣扬的梦想。由于他的辛勤工作和对研究的奉献，他不仅加深了对自然的认识，而且作为波兰人赢得了世界的尊重。而当时波兰甚至不存在在世界地图上。

## **Benedykt Dybowski (1833-1930)**

**Benedykt Dybowski dedicated his love to many. Apart from his loved ones, he loved his homeland and science. He dedicated his time to the latter, even under challenging conditions, in exile. It was in distant Siberia where he made the most significant discoveries of his life. Exploring the then-unknown nature, he became known as a man with a great heart.**

Benedykt was born in what is now Belarus on April 30, 1833. He grew up on his grandfather's estate in a prominent noble family. Initially, he received homeschooling, and his first teachers were his parents, tutors, and older siblings. It was then that he became interested in nature, establishing his first herbariums and aquariums. This youthful love lasted until he studied medicine at Tartu (earlier Dorpat) University, where he also took zoology courses. After three years of study, he wrote a book: *On the Freshwater Fishes of Livonia*, for which his professors awarded him a gold medal. Despite this success, he was expelled from the university because... he agreed to be a second in a duel. He moved to Breslau and then to Berlin. Only after obtaining his doctorate did he return to Tartu (earlier Dorpat).

### **Exile**

The patriotism he learned at home encouraged him to undertake social activities. During his studies, he was an activist in Patriotic Society and later in the Lithuanian National Organization. He also believed that the nation's strength depended on sobriety. Together with seven friends, he founded a group of abstainers called the "Milk Brothers." They strongly opposed the alcoholism spreading in Poland. His participation in one of the demonstrations later prevented him from taking the position of zoology department chair at the Jagiellonian University. Eventually, the recently opened Warsaw High School offered him an assistant professor position. Soon, he was arrested because he participated in the organization of the January Uprising. After spending several months in prison, he heard the sentence: 12 years of hard labor in faraway Siberia. When he boarded the train with other deportees, his friends gave him a microscope, a first aid kit, and a set of surgical instruments. But foremostly, they gave him books. Dybowski dreamt about traveling. He wanted to go to Madagascar - there, while working as a doctor, he would be able to study the island's nature, which was poorly known. It turned out differently, but it did not break him down. He decided to fulfill his dreams in deep Russia. At that time, these areas were not examined either.

### **Obsession**

Dybowski always tried to organize his day to find some time to collect specimens for his research. It was not easy during his forced labor, as everyone who failed to complete a task would receive a severe punishment. Dybowski found time for everything, even running a free medical practice. He gained the respect of the locals and authorities. With time, they began to appreciate both his Berlin diploma and the value of his scientific work. That, in turn, gave Benedykt more freedom to move around and collect more specimens for research (which became his obsession). He was so devoted to the matters of science that he ignored his health. He often spent nights on the bare ground and the muddy banks of rivers. He sailed in a boat

constructed with his own hands and faced many dangerous adventures. He also drove a wagon. Once, he left it standing water for 12 hours. As a result, it got so wet that the researcher lost some of his valuable notes, clothes, and books. He even slept on the surface of the frozen Lake Baikal - he constructed a portable, stove-heated house, which was once blown over by a gust of wind.

After several years, Dybowski was allowed to come back to his homeland. However, he did not find any job. He returned to Siberia for the next five years. As he said, he was going "outside his Homeland," but "only for the sake of his Homeland." His primary motivation was to work for a country that did not even exist at that time. During his second stay in Siberia, he worked as a doctor in Kamchatka. He researched and collected animal and plant specimens, set up hospitals for the leprosy, administered smallpox vaccinations, and taught the local people about animal husbandry and plant cultivation.

## **Recognition**

In Dybowski's time, Russian scholars believed that Baikal's fauna consisted mainly of fish. Benedict believed this to be an inaccuracy. What do fish eat, then? Using self-constructed equipment, he caught many mollusks, crustaceans, sponges, and other animals still unknown to science. He also discovered new species and subspecies of fish, some of which were endemic, i.e., lived only in Lake Baikal. The collected material was so vast that Dybowski was not able to process it on his own. Having prepared it beforehand, he sent it to the country. His brother Wojciech, a biologist and an assistant professor at Dorpat University, helped him with his work. Dybowski described several hundred new species and, using the deep-sea measurements, also proved that Baikal is composed of two basins: eastern and western. These are, in turn, separated by a dike, located no deeper than 60 meters from the surface. Although he also studied marine animals and terrestrial flora and fauna (mainly birds), he received a gold medal from the Geographical Society for his study of Lake Baikal. It was also suggested that his nickname "Baikalski" be added to his name - just as they would call the generals who conquered new territories. Dybowski strongly objected because he did not want a Russian nickname next to his Polish name. Nonetheless, his last name has been used to name the new species of animals he discovered, e.g., one species of a deer is named *Cervus Dybowski*. During his second expedition to Siberia as a free man, he also conducted anthropological and ethnographic research. He collected elements of clothing and objects of everyday use of Siberian peoples.

Dybowski published over 350 works. Among them, you can find scientific treatises on zoology, animal systematics, comparative anatomy, and travel memoirs. Although he went into exile to a territory from which many did not return, Siberia turned out to be the fulfillment of his dreams and ideas, which he preached all his life. Through his hard work and dedication to research, he deepened his knowledge of nature and gained respect in the world as a Pole. He did this when Poland was not even an independent country that one could find on the world map.



## 伊格纳齐·莫希奇茨基 Ignacy Mościcki (1867-1946)

对科学充满激情又因偶然当上了总统。献身波兰，一位被科学实践所吸引的爱国者。由于他的发明和专利在世界范围内使用，他获得了国际认可。他的工程意识不仅体现在组织实验室、公司和研究所或培训新专家方面，而且促进饱经战火的波兰的经济发展。

伊格纳齐 1867 年出生于在梅扎诺沃。他的祖父、父亲和两个叔叔都为祖国参军。他从小就表现出对数学和自然科学的学习技能，但显然他不喜欢化学。尽管如此，出于实际原因，他还是选择读化学专业。据说他读过一份关于木材干馏的传单 - 一种技术过程，能产生煤和木瓦斯。他想起来他住的庄园里长满树木。因此，这些知识在未来可能对他有用。

他毕业于里加的化学专业，但没有为自己的工程论文答辩。作为通缉犯，他不得不逃离沙皇警察的追捕。他与妻子米哈琳娜一起出发途经柏林和鹿特丹前往伦敦。由于找不到和化学相关的工作，他从事过许多工种：生产克非尔，木工及装饰家具。此外，他还曾在印刷厂工作过一段。这份工作稍微改善了家庭收入。但这份工作并不令人满意，为了追求自己的爱好，莫希奇茨基常常一头扎进图书馆，学习化学。同时，他还继续着他的爱国运动。

### 科学家

在伦敦波兰侨民的努力下，他被弗莱堡大学聘用。他的工作任务包括了课程准备。他的工程意识就派上用场了，因为当时大部分教具都需要亲自准备。物理讲座的演讲效果如此壮观以至于不仅该学科的学生，甚至研究人文学科的人都来看。他的科研职业发展很快，由于他所拥有的发明和专利，他不仅逐渐富裕起来，而且开始被视为科学权威。

当他在瑞士工作时，科学界被当时非常著名的化学家威廉·克鲁克斯（William Crookes）的信息所震撼。他预测非常重要的矿物肥料—智利硝酸盐—矿藏将很快耗尽。该信息确实不仅让粮食生产国（担心产量低得多）感到害怕，而且吓坏了许多担心饥荒的国家政府。此外，由硝酸盐生产的硝酸是一种对许多行业非常重要的化合物。我们呼吸的空气中也含有大量氮气，而氮气是关键的因素。不幸的是，没有人知道如何将大气中的氮转化为硝酸。莫希奇茨基解决了这个问题—这给他带来了真正的名气和财富。

### 发明家

他的想法在小型实验室的规模上被证明非常有效。不过，当莫希奇茨基建造大型工厂开始规模生产时他遇到了几个问题。硝酸生产装置的核心是一个巨大的电容器。问题是莫希奇茨基的时代没有这么大的电容器。到了这个阶段许多科学家会放弃，但莫希奇茨基表示，他将首先设计并建造装置中缺失的部件。在接下来的 25 年中，他制造的电容器首屈一指，整个设备的原始设计使莫希奇茨基被认为是科学天才。他的研究成果发表在 60 多篇科学论文中，并描述在 40 项大规模使用的专利中。尽管最著名（并产生最大利润）发明涉及电容器和炉灶，但借助于莫希奇茨基的功劳的发明有例如：不产生雾气的双层窗户。莫希奇茨基的电容器不仅用于化学装置，还用于保护电力线缆，以及建造无线电报站，例如安装在埃菲尔铁塔上的电报站。

虽然莫希奇茨基没有接受过常规的教育，为表彰他的功绩，利沃夫理工学院授予他荣誉博士学位。因此未来的波兰总统可以在那里以教授的身份讲学。就是在利沃夫，他创建了电化学和物理化学专业，配备了从瑞士带来的设备。他培养着未来的工程师。他也实现了关于研究所的梦想。在利沃夫工作期间，他对天然气和石油开采产生了兴趣。他研发了几个非常重要的技术解决方案。他管理了霍茹夫一家政府化肥厂，不仅使工厂免于倒闭，而且还进行了现代化改造，使得产量增加。在接下来的几年里该工厂在欧洲取得了最好的成绩。

### 政治家

即使成为总统后，他依然从工程和技术的角度来审视国家的需求。他参与了研究所的会议。他发起了战略公司的建设，例如登比察（Dębica）的合成橡胶厂和 Rożnów 的水力发电厂。他还监督了在塔尔努夫-莫希奇茨（Tarnów-Mościce）的氮化工厂的建设。他们的产量甚至比前面提到的霍茹夫工厂更大。由于许多不同的活动和后勤能力，他使得波兰经济迅速繁荣。

纵观伊格纳齐·莫希奇茨基的一生，不难看出他是一名实践者，凭借他的工程意识他制造了创新设备并建立了波兰经济基础。从选择学业到担任总统，他竭尽全力确保他的行动有一个可衡量的目标。他的志向是如此重要，以至于大学文凭似乎是次要的。虽然他没有正式完成学业，但他取得了许多成就。他被授予的荣誉称号是为了表彰他的工作和成就。如果你热爱某件事，你可以在任何情况下去做，并且为他人也做出贡献。

## **Ignacy Mościcki (1867-1946)**

**Mościcki was a scientist by passion, a president by accident, a patriot dedicated to Poland who was passionate about the practical side of science. Thanks to his inventions and patents used all over the world, he gained international fame and recognition. His engineering sense was practical in organizing laboratories, companies, institutes and educating new specialists. He used it to raise the economy in post-war Poland.**

Ignacy was born in Mierzanów in 1867. His grandfather, father, and two uncles fought for their homeland. Since childhood, he had a flair for mathematics and science, but apparently, he did not like chemistry. Nevertheless, he chose to study it for practical reasons. Supposedly, he found a leaflet about dry wood distillation - a technological process that produces, among other things, charcoal and wood gas. He thought that since there were many trees on his family estate, this knowledge could prove helpful in the future.

He graduated from chemistry in Riga but did not defend his engineering thesis. As a wanted conspirator, he had to flee from the tsarist police. Together with his wife Michalina, he escaped to London through Berlin and Rotterdam. Unable to find a contract as a chemist, he took up many jobs: he produced kefir, worked as a carpenter, and decorated furniture. He also worked in a print shop, and only this job improved the family budget a little. However, Mościcki wanted to pursue his passions. Therefore, he visited the library and profounded his knowledge of chemistry. He also continued his patriotic activities.

### **Scientist**

Thanks to the efforts of the Polish community in London, he was employed at the University of Freiburg. One of his tasks at work was to prepare demonstrations. His engineering sense came in very handy at this time as he designed most of the teaching aids with his own hands. Impressive illustrations of physics lectures were so spectacular that both his students and people studying humanities attended. He quickly developed as a scientist, and thanks to his inventions and patents, he gained wealth and scientific authority.

While he was working in Switzerland, the scientific world was electrified by the writing of a very famous chemist, William Crookes. He predicted that the deposits of Chile saltpeter, an essential mineral fertilizer, would soon be exhausted. This genuinely frightened not only the food producers (who feared much smaller yields) but also the governments of many countries, who feared famine. Besides, nitric acid, an essential compound for many industries, was produced from saltpeter. Large quantities of vital nitrogen are present in the air we breathe. Unfortunately, nobody knew how to turn atmospheric nitrogen into nitric acid. Mościcki solved this problem - it brought him real fame and money.

### **Discoverer**

His idea worked well on a small scale in a laboratory. Yet, when Mościcki began constructing installations on a large, industrial scale, he encountered several problems. The heart of the nitric acid installation was a colossal capacitor, but in Mościcki's days, there were no devices of such

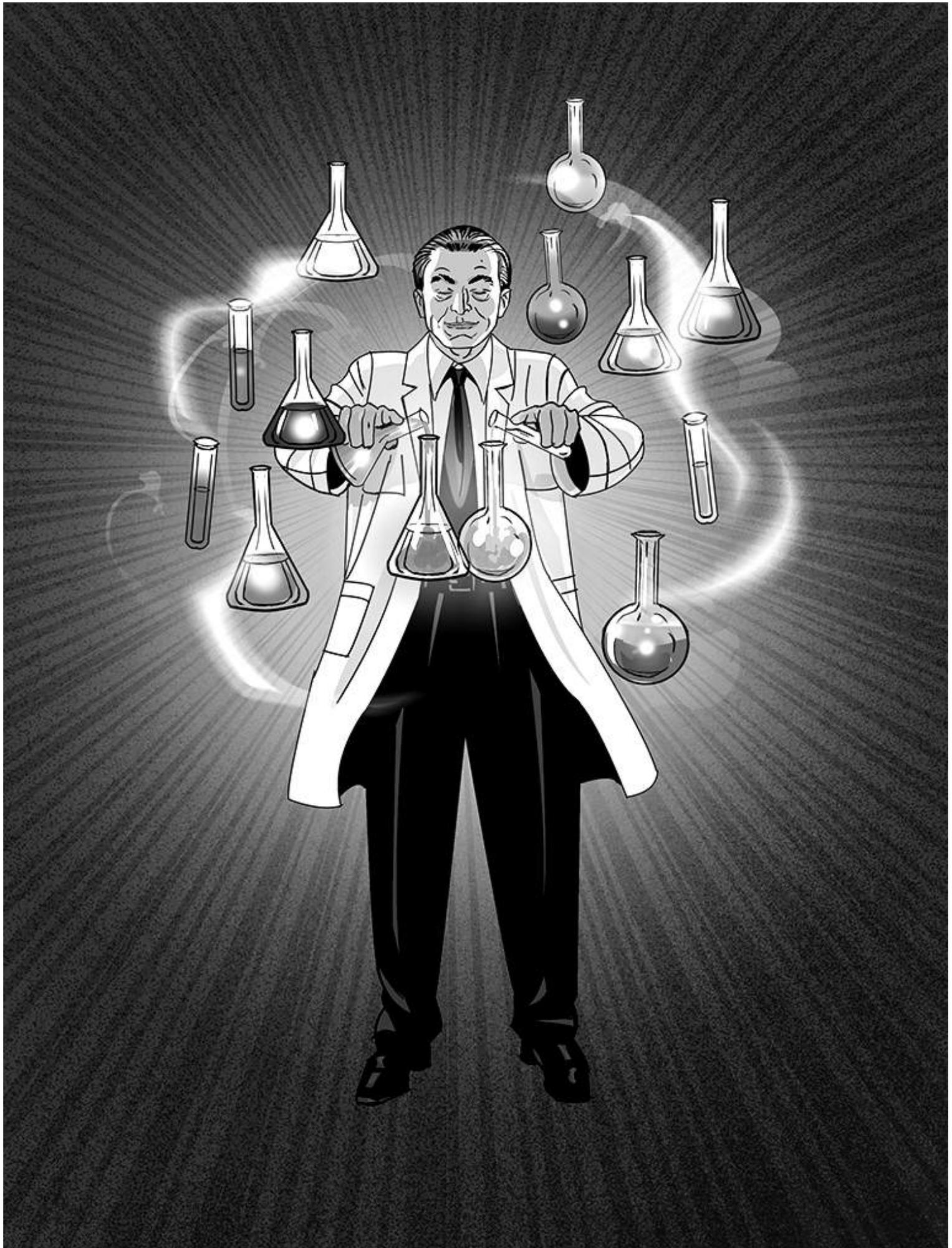
size. Many scientists would have given up at this point, but Mościcki decided to design and then build the missing elements of the installation. The capacitor that he created was unrivaled for the next 25 years. Thanks to the original design of the whole device, Mościcki was treated as a scientific genius. Mościcki's capacitors were part of chemical installations, protected power lines, and comprised radiotelegraph stations, such as the one installed on the Eiffel Tower. His research results were published in over 60 scientific papers and described in 40 patents used on a large scale. Although the most famous (and the most profitable) patents concerned capacitors and furnaces, Mościcki also created the non-steamable double glazing windows.

Even though Mościcki had no formal education, in recognition of his merits, the Imperial and Royal Polytechnic School in Lviv awarded him an honorary doctorate. Thanks to him, the future Polish president could teach there as a professor. He created the Department of Electrochemistry and Physical Chemistry in Lviv, which he equipped with equipment from Switzerland. He lectured, educating future engineers. He also realized his dream of a research institute. While working in Lviv, he became interested in gas and oil extraction. He was the author of several fundamental technical solutions. He also managed the government-owned fertilizer factory in Chorzów, which he modernized and saved from bankruptcy. As a result, production increased, and in the following years, the factory reported the best financial results in Europe.

## **Politician**

Even when Mościcki became president, he looked at the country's needs through the lens of engineering and technical expertise. He attended meetings of research institutes. He initiated the construction of strategic companies, such as the Synthetic Rubber Factory in Dębica and the Hydroelectric Power Plant in Rożnów. He also supervised the creation of Nitrogen Works in Tarnów-Mościce. They reported an even higher production volume than the previously mentioned factory in Chorzów. Thanks to his many different activities and logistic abilities, he was the father of the economic leap in Poland, reborn after the partitions.

Throughout his life, Ignacy Mościcki was a practitioner who, with his engineering sense, constructed innovative equipment and built the Polish economy. From his choice of studies to his presidency, he did everything to ensure that his actions had a measurable purpose. His pursuits were so crucial that earning a college degree seemed secondary. Even though he did not formally graduate from any university, he accomplished a great deal. Honorary degrees, of which he had several, were bestowed upon him as recognition for his work and accomplishments. If you love something, you can do it under any circumstances and still benefit others.



## 卡齐米日·冯克 KAZIMIERZ FUNK (1884-1967)

如果没有他，我们可能无法了解一些对人体健康最重要的物质。即使我们知道了，我们也很可能以别的名称认识：营养物、食物激素或食物辅助因子。卡齐米日·冯克是维生素发现者。他也是“维生素”这个全球通用词的创造者。由于发现者的决心，一个新的医学时代开始了，并催生出了营养学。

### 科学旅行者

卡齐米日 1884 年出生于华沙。他在 2 月 23 日一个星期六出生在一个医学家庭。他的父亲雅各布是一名皮肤科医生，从事医疗实践和临床试验。母亲一古斯塔瓦也是一名受过教育的医生，她放弃了自己的职业全身心地投入到家务。但他的父母并没有给他灌输过多的学习的热情。在德国奥格斯堡附近的一家医院里唤醒了他对学习的热情。是在他的先天性髋关节缺陷 - 髋关节发育不良的治疗过程中发生的。据说，回家之后他的德语水平已很高。

此次旅行是他未来生活的预览。当他 16 岁，在华沙高中毕业之后便前往日内瓦。在那里学习生物学。然后搬到布尔诺，研究化学的秘密。他在 20 岁时通过博士答辩证明了自己的聪明才智。获得毕业证书不是终点，而是科学之旅的开始。令人着迷，但并不总是那么简单。

### 见地与决心

通过研究工作表明，卡齐米日对研究对象的想法与其他人不同。由于他的洞察力在处理微量元素时他不像化学家那样认为都是杂质，而是将微量元素视为生命必不可少的成分。当他专注于癌症时，他发展了自己关于癌症如何发生的理论。他认为与饮食有关。他认为食物中有两类物质。其中一些促进肿瘤的发展，而另一些则起到抑制作用。如果缺少抑制疾病物质，则疾病会发展。不幸的是，他没有进一步发展他的概念，而今日我们知道影响癌症发展的因素有很多，包括那些与食物无关的因素。嗯，即使是伟大的科学家也会犯错。尽管他对很多科学感兴趣，但他越来越关注营养问题。研究狗的饮食时，他注意到除了脂肪、蛋白质、糖和矿物质外，还有其它物质是身体正常发育所必需的。不幸的是，由于与一位不断质疑他的研究成果和研究方法的科学家发生冲突，他无法继续他的研究。失踪的谜题—维生素—是他在伦敦工作时发现的。除了洞察力以外，他在科学活动中发挥了巨大决心。由于这一点，他通过处理胰岛素的生产发展了波兰糖尿病学研究。他用很少的财政资源，将自己的健康置于危险之中最后大获成功。他对已经使用的几种药物的配方进行了现代化改造，但最重要的是，他为一门关于维生素的新科学奠定了基础。

### 维生素不是细菌

1910 年，在伦敦逗留期间，他开始了与脚气病相关的开创性研究—脚气病会导致包括肌肉萎缩和记忆障碍等。当时而言往往是致命性的，尤其在热带地区是一个大问题。这种疾病困扰着很多人，主要是在以白米为主要食物的大型港口城市的居民中。糙米不能存放在高湿度环境中。此外，糙米被认为不是很好吃的。

在他工作的预防医学研究所所长查尔斯·J·马丁（Charles J. Martin）的鼓励下，冯克对废弃掉的米糠进行了调查。所长一定认识克里斯蒂安·艾克曼（Christiaan

Eijkman) 的研究成果, 他注意到被移除的大米的外壳含有一种对抗脚气病的物质。据马丁说, 该物质是某种氨基酸。由于冯克在巴黎时已经研究过此类分子, 因此他有能力开始这项研究。初步结果表明所长错了。根据冯克的研究, 从米糠中分离出的缺失物质含有氮, 但并不是氨基酸。查看其化学性质, 他发现该物质属于一组称为胺(拉丁胺)的化合物。因为他意识到它在生命中的重要作用(拉丁文 *vita*—生命), 他称它为“维生素”。研究所当局不喜欢这个想法, 并淡化了这个叫法, 给卡齐米日的作品带来了完全不同的效果。

维生素一词仅在 1912 年出现在冯克的科学著作中。这是借助于另一位杰出的波兰人——德维克·莱赫曼(Ludwik Rajchman)——伦敦皇家公共卫生研究所细菌学系主任。除其他外, 他是科学期刊的出版商之一。由于发表的作品不是实验性的, 因此他不必对其内容征求上级的意见。因此他能够以自己设定的方式描述他想要的一切, 包括发现和分离治疗脚气病的新物质以及其它已知的维生素性质化合物的历史。回顾过去, 最重要发现的是适当的饮食对于预防佝偻病、糙皮病和坏血病等许多疾病很重要。

说服科学界接受一个新观点并不容易。饮食中缺乏这些“新”化合物会导致疾病的观点很难接受。当时, 科学界掀起了“细菌时尚”, 许多科学家在罗伯特·科赫(Robert Koch)或路德维克·巴斯德(Louis Pasteur)的突破性发现的启发下到处都看到了微生物的作用。另一个问题是冯克没有分离出纯维生素形式。但随着时间的推移, 关于维生素的出版物越来越多。称为维生素 B1, 即硫胺素的化合物的结构也被发现。从冯克的书目中可以看出维生素领域的研究进展有多快。第一部包含 385 篇, 8 年后出版的另一本参考书目基于 1595 篇出版物。

## 健康的未来

卡齐米日·冯克不想把科学发现锁在研究所的抽屉里。他为维生素及其在维持人类健康中的作用打开了一个新的、伟大的研究领域的大门, 他深知必须将这些知识付诸实践。他意识到适当饮食、锻炼以及新科学发现有助于人们免受许多疾病的侵害。卡齐米日·冯克的科学成就在我们这个时代也很有价值。因为在现代生活中没有维生素和健康的生活方式是不可思议的。

## **KAZIMIERZ FUNK (1884-1967)**

**If not for him, we might not have known some of the fundamental substances for our health. Even if we did, we would most likely know them under other names: nutramine, dietary hormone, or auxiliary food factor. Kazimierz Funk is the discoverer of vitamins. He also coined the term, which is used today by the whole world. Thanks to the discoverer's determination, a new era of medicine began, giving rise to the science of nutrition.**

### **Scholarly traveler**

Kazimierz was born in Warsaw in 1884. He was born on Saturday, February 23, into a medical family. His father, Jakub, a dermatologist, practiced medicine and conducted clinical research. His mother, Gustawa, also a doctor by training, gave up her professional career to care for the home. However, his parents did not instill in him a passion for science. He caught it in a hospital near Augsburg, Germany. It happened during treatment of his congenital hip defect - hip dysplasia. Upon returning home, he spoke excellent German.

The trip was a sign of what his future life might look like. The language skills he had acquired earlier came to be helpful. At the age of 16, after graduating from high school in Warsaw, he went to Geneva to study biology. Then he moved to Brno, where he studied chemistry. He defended the doctorate at the age of 20. Obtaining the diploma was not the end but the beginning of a scientific journey - fascinating but not always easy.

### **Detail and Determination**

Even his first research works showed that Kazimierz looked at the objects of study differently from others. His insight meant that, unlike chemists, he did not see trace elements as contaminants but as vital components. When he focused on cancer, he came up with a theory of how it occurs. He saw the cause in food. He said that food contains two types of chemical compounds - one promoting cancer development; the other inhibiting it. If the latter is lacking, the disease develops. Unfortunately, he did not develop his concept. Today, we already know that many factors affect cancer development, including those that have nothing to do with food. Well, even great scientists make mistakes. Despite his various scientific interests, his primary focus was nutrition. In his research on the diet of dogs, he noticed that in addition to fats, proteins, sugars, and minerals, there were other substances necessary for the proper development of the body. Unfortunately, he could not continue his research due to a conflict with one scientist who continually challenged his findings and research methods. He discovered the missing puzzle - vitamins - while working in London. In addition to being focused on details, he was also a determined scientist. To determine Polish diabetology, he started producing insulin. He did it with little money, risking his health. He modernized the formulation of several medicines already in use, but above all, he laid the foundations for a new science of vitamins.

### **Vitamin, Not a Bacterium**

In 1910, while staying in London, he began his groundbreaking research related to beriberi - a disease that causes, among other things, muscle atrophy and memory disorders. In those days, contracting the disease was often fatal and posed a significant problem in tropical regions — the disease affected many people, mainly in large port cities where white rice was the primary source of nutrition. Brown rice could not be stored in high humidity. Besides, it was considered not very tasty.

Encouraged by Charles J. Martin, director of the Institute of Preventive Medicine, Funk set about researching rejected rice bran. The director was probably familiar with the results of Christian Eijkman's research, who noted that there was an anti-beriberi substance in the discarded husk. According to Martin, it was a type of amino acid. Since Funk had already worked with such molecules while in Paris, he was competent to begin the research. The preliminary results showed that his boss was wrong. According to Funk, the missing substance isolated from rice bran contained nitrogen, but it was not an amino acid. Looking at its chemical properties, he concluded that it belonged to a group of compounds called amines. Because he was aware of its essential role in life (Latin *vita*), he called it a vitamin. This idea, however, did not attract the authorities of the institute. They disregarded the name and gave a completely different accent to the works written by Kazimierz.

The word vitamin entered Funk's scientific work only in 1912. It was made possible by another prominent Pole - Ludwik Rajchman - head of the Bacteriology Department at the Royal Institute of Public Health in London. He was, among other things, the publisher of one of the scientific journals. Since the published work was not experimental but a review, he did not have to ask his superiors for their opinion on its content. As a result, he was able to describe everything in the paper in the way he wanted. He included the story of discovering and isolating a new substance curing beriberi and other known compounds of vitamin nature. Most important, in retrospect, was the hypothesis that a proper diet is essential in preventing many diseases such as rickets, pellagra, and scurvy.

Convincing the scientific community to the new view was not easy. The idea that deficiencies of these "new" compounds in the diet could cause disease was difficult to accept. In the scientific world at the time, there was a "fashion for bacteria," and many scientists inspired by the groundbreaking discoveries of Robert Koch or Ludwig Pasteur looked everywhere for the role of microorganisms. The fact that Funk had not isolated a pure form of the vitamin was also a problem. However, as time went on, publications on vitamins became more numerous. It was also possible to learn the structure of the compound that was called vitamin B1, or thiamine. The progress of work in the field of vitamins is clear from the bibliography of books published by Funk. The first contained 385 papers. The next one, published eight years later, was already based on 1595 publications.

## **Healthy Future**

Kazimierz Funk did not want to close the achievements of science in the drawers of his office. When opening the door to a new, large field of research on vitamins and their role in maintaining human health, he understood that this knowledge had to be implemented in practice. He was aware that a proper diet supported by exercise and new scientific discoveries would protect people from many diseases. Kazimierz Funk's scientific achievements are of

great value also in our times. Can we imagine modern life without vitamins and a healthy lifestyle?