

The Speleologist Who Wrote Too Much

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To some, he is the father of speleology. His book *The Subterranean World* was a classic. And he knew how to make money. But now very few remember him. So what went wrong for Athanasius Kircher?

Athanasius Kircher was born in Geisa in what is now central Germany on May 2, the feast day of St. Athanasios, 1602. He, like his five brothers, entered a religious order, probably because the family was too poor to pay for an education. But Athanasius was a bright man, and he went to a great number of Jesuit institutions, where he learned Greek and Latin and studied humanities, natural science, mathematics, philosophy, and theology. He received a doctorate in divinity, and he became a Jesuit in 1618.

Athanasius's life was full of near misses with death, something he liked to recount to anyone willing to listen. He escaped death several times during childhood. Once, while swimming in a mill pond, he was suddenly caught by the current and swept toward the wheel, where, instead of being mangled by the machinery, he passed through unharmed. Later, at a horse race, the pressure of the crowd pushed him under the feet of the oncoming horses. He crouched motionless and again emerged untouched. On another occasion, he made a two-day journey to see a play in a neighboring town. Lost on the way back and in fear of robbers, wild boars, and bears, he spent the whole night up in a tree. When he was fifteen, he got chilblains while skating, and his skin turned gangrenous. He thought he was going to die. He prayed earnestly, and the next morning he was cured. "It was a miracle," Kircher said.

He would later have to run for his life. In late 1621, Duke Christian of Brunswick, a notorious Jesuit-hater, was approaching the German town of Paderborn, where Athanasius was residing. Kircher and two others fled the city and escaped, while many other Jesuits were caught, bound, and beaten. Kircher and his fellow escapees struggled for three days through deep snow, ill-clad and penniless, begging for food, until a friendly Catholic nobleman gave them shelter. They continued on to Cologne and tried to cross the frozen Rhine. The locals had assured them that it was safe, but, when he was halfway across, a piece of ice broke loose and carried Kircher downstream. He swam to the bank through freezing water and walked for three hours until he reached safety.

During another trip through Protestant territory, Kircher obstinately refused to travel disguised in lay clothes, saying, "I would rather die in the robes of my order than travel

undisturbed in worldly dress." A party of Protestant soldiers ambushed him, he was stripped and beaten, and they prepared to hang him from the nearest tree. His calm demeanor so moved one of the soldiers that he persuaded his comrades to spare the life of the young novice. Not only did they leave him with his clothes and books intact, but the compassionate soldier returned, gave him money, and urged immediate flight.

Sent to Vienna in 1635, he embarked with some other brothers for the first stage of the journey, by sea from Avignon to Marseilles. They were all ill, so the captain landed them on an island "for a rest" and promptly sailed away with all their possessions. They managed to hail some fishermen, who took them the rest of the way to Marseilles. Next, on their way to Genoa, a storm blew up, and for three days they had to shelter in a cove. No sooner had they set sail again than a violent storm drove the boat back toward the coast. When at last he reached Genoa, he set out on another boat for Leghorn, ninety miles to the south. This time his ship was blown by a storm to Corsica, before managing to dock far past his destination at Civita Vecchia, the main port of Rome. Kircher could not miss the chance to see the Eternal City, so he set out on foot for the forty-mile trip. On reaching Rome, he found to his amazement that he was expected, his orders having been changed without his knowing it, and he was offered a job. He was to stay at the Collegio Romano, the Vatican's university, with a special commission to study hieroglyphs and to teach. His belief that God had spared him for better and greater things was fully confirmed, and he decided to become the most prolific scholar of his time.

He finally had all the leisure, assistants, and money he needed to conduct his scientific and humanistic investigations. For the next forty-five years, until his death, he dedicated his life to studying and writing in Rome. For the first eight years, he also had teaching responsibilities. He could teach an impressive range of studies, Greek, grammar, mathematics, physics, philosophy, Syrian, Hebrew, and music. He was supported by the patronage of the Pope, as well as aristocrats from all over Europe. And he knew how to be thankful. Kircher had so many supporters that he eventually began to dedicate not just his books, but individual chapters in his books, to them. Furthermore, sometime around 1660 Kircher sold exclusive rights to his books to a prominent Dutch publisher for a large sum of money. He was probably one of the first scholars able to obtain funding by the sale of his works.

Kircher was famous mainly for his study



of Egyptian antiquities and hieroglyphs. He was also famous for his notable museum, probably the first public museum in history. From a wide variety of nobles and rulers, mostly German, he received extensive gifts of stuffed animals and birds from

the New World. Growing increasingly pious as he grew older, Kircher discovered and restored the ruins of an ancient church, built by the emperor Constantine at the place where St. Eustace saw his vision of Christ in a stag's horns. Kircher reestablished this as a place of pilgrimage, and, after he died in Rome on November 28, 1680, his heart was buried in the grounds of the church he had reconstructed.

But Kircher was a polymath, and he tried to know and publish about everything. He was called the master of a hundred arts by his contemporaries. He is believed to have been able to read sixteen languages. He published forty-four books, and more than two thousand of his manuscripts and letters have survived. Some of his books were huge, with large print and impressive illustrations. Among the discoveries that he and some of his supporters claimed he made was that bubonic plague was caused by tiny animals, which he called *contagium animalium*, he had observed under a microscope. Because of his vast knowledge of languages, he imagined he was able to translate Egyptian hieroglyphic writing, and he has been labeled by some the founder of Egyptology.

Among his mechanical inventions were a graduated aerometer and a device for measuring magnetic force with a balance. He also promulgated the use of magnetic declinations to find longitude, described a method of measuring temperature from the buoyancy of small balls, and designed and built sundials. From time to time he did surveying and mapping, and he devised an instrument for triangulation. In 1638, Kircher wrote a book to instruct knights in the solving of "the most important mathematical and physical problems." This involved use of a geometric calculator, Kircher's pantometer. It has been said that he invented a counting machine, a speaking tube, and an aeolian harp. He was also credited with the invention of the magic lantern, a sort of slide projector. His reputation brought scholars, letters, and specimens to his study from all over the world, and he amassed a veritable museum of artifacts, curiosities of natural history, and scientific apparatus. He wrote hundreds of letters and interviewed innumerable visitors. And he was very much fascinated by the subterranean sources of water and fire.

KIRCHER, THE SPELEOLOGIST

During a trip in 1630, Kircher witnessed a violent eruption of Mount Etna. He was so impressed by the phenomenon that after the eruption subsided he had himself lowered into the cone for closer observation. This may have been the original inspiration for his book *Mundus Subterraneus*, probably the first printed work on speleology. He added geological observations made during his visit to Sicily in 1637 and 1638. The book, to be sure, deals with more than the geosciences, and contains chapters on other things like alchemy, chemistry, biology, and metallurgy. So the book's title is misleading, unless Kircher meant it to only mean that he was dealing with many topics beyond human view. The book became a popular, lavishly illustrated textbook.

Kircher's main speleological idea in the book was his hypotheses on the origin of the water flowing from springs. He postulated that there were vast underground water reservoirs, which he called *hydrophylacia*, in many parts of the world. How did the water get there in the first place and then reemerge? According to him, sea water was sucked down in whirlpools and drawn into underground channels that conveyed into reservoir caves in the mountains. He situated some of these *hydrophylacia* hundreds of kilometers away from the sea and many hundreds of meters above sea level. He thought that "the sea, by pressure of air and wind or movement of the tide, pushes the waters through subterranean passages to the highest water-chambers of the mountains." He indicated that the presence of whirlpools such as the Maelstrom off Norway was proof of the suction mechanism. These whirlpools were places where there were connections among the oceans. This was based on his own observation in 1638 in the Strait of Messina, where, besides the noise of the surge, a dull subterranean rumble attracted his attention. He even tried to demonstrate his theory with experiments. At least part of the energy necessary to make this happen came from the "internal heat" of the earth. He was a firm believer in the idea of earth's internal heat, based on the observation that the temperature in mines increases with depth. For him, many natural phenomena, including the formation of minerals, were due to the fact that there was fire under the earth's crust. And hot water-vapor will rise in the caverns and condense in the cold rocks, producing springs. He does mention the real origin of spring water, rain, but does not give it much importance.

The preparation of *Mundus Subterraneus* began as early as 1658, and shortly afterwards a preliminary version appeared as a 171-page supplement to another book of his. The first full-fledged version of the book was published in 1665. It was two volumes totaling 892 large pages. A new edition,

published in Amsterdam in 1678, contained lengthy additions on caves in Switzerland, Austria, Italy, and the Greek islands. This edition achieved more popularity and became the standard geology text for the rest of the seventeenth century.

KIRCHER, FATHER OF SPELEOLOGY?

Some have advanced the idea that *Mundus Subterraneus* was the first speleology book. If, as some have proposed, Kircher is the father of geology, why not the father of speleology? Well, we all know that some of the most brilliant scientists blundered at times. Darwin didn't get genetics right in his *Origin of Species*, and Einstein later regretted adding a mysterious cosmological constant to his theory of relativity. Newton and Boyle, contemporaries of Kircher, believed in alchemy. But all of these scientists are remembered and respected for theories such as Darwin's evolution by natural selection, Einstein's relativity, Newton's calculus and law of gravity, and Boyle's law relating the pressure and volume of gasses. Is there anything we can remember Kircher for?

Kircher not only got wrong the water cycle of the Earth and the mechanisms of underground water, but his wrong ideas had been proposed by others four centuries earlier. Many of his statements were absurd. He believed that caves were inhabited by dragons, unicorns, and giants. He even included drawings of such monstrosities in *Mundus Subterraneus*. According to him, "it is not implausible that, as under the earth all kinds of fish occur and live, also earth animals stay there, that is all kinds of Mice, Snakes, Dragons, as well as others, that find their origin in rotten matter." The cave fishes that he mentioned as occurring in several places in Europe must have been imagined, since no true cave fish have ever been found there.

Kircher's absurd ideas were not confined to speleology. He believed in the transmutation of metals, particularly of iron into copper, in the spontaneous formation of fossils from minerals, and the spontaneous generation of living organisms. He said he had performed palingenesis, the resurrection of plants from their ashes. He also believed in astrological influences on human health and terrestrial cataclysms. He believed in mermaids and opposed the theory that the sun was the center of the solar system.

Perhaps he was just careful about espousing new, revolutionary ideas. After all, he was a Jesuit living in the theocratic Rome that had burned Giordano Bruno and condemned Galileo. Deviation from the norm was heresy, and the Society of Jesus had been formed during the heat of the Counter-Reformation to convert the heathen and combat heresy. But this is, at best, a superficial explanation. He was, above all, a

person who never saw things with a skeptical eye. Even many of his contemporaries criticized him for this behavior, and twentieth-century scholars have been fierce in their criticisms. He has been accused of gullibility, error, ignorance, and filching ideas. Someone called him a scholarly windbag. Even his alleged discoveries and inventions have come under fire. Medical historians do not credit him with authentic observations on microbiology or infectious diseases. He established no useful general laws and made no stimulating suggestions for research. The invention of the magic lantern was not his, but a Danish physicist's. Real translation of the Egyptian hieroglyphs was not achieved until after the Rosetta Stone was discovered in 1799. Even the suggestion that he might have actually visited the caves in his native Rhön cannot be confirmed.

Maybe his fault really was in believing everything he heard. Kircher enjoyed the privilege of living in Rome, the center of a worldwide network of Jesuit missionaries and others who reported to there on their journeys. No matter how fantastic a tale may have been, he recorded and published it. As the editor of one of our present-day tabloids might say, "If you believe it, we will publish it." That is why Kircher is seen today as more a historical curiosity than a real scientist. And that is why few take seriously the idea that he might be considered the father of speleology.

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