

## Hypatia (mathematician, astronomer, and philosopher)

355-415 AD



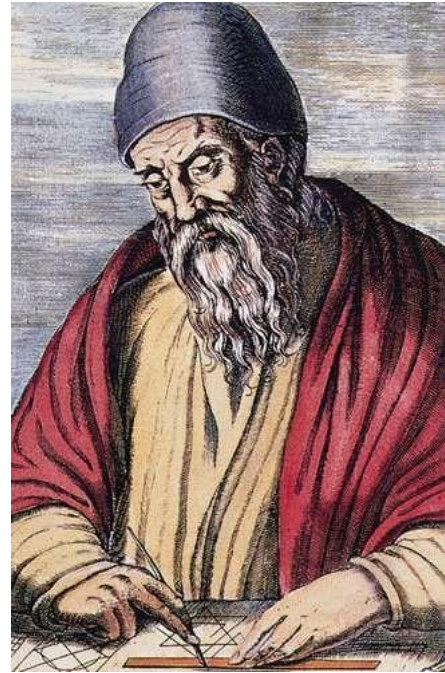
Hypatia was a famous mathematician, astronomer, and philosopher in Alexandria in 412 AD. She was a woman of great intellectual achievement and known as the world's greatest mathematician at that time. She was known for her great beauty, devoted celibacy, and popularity as a teacher of mathematics, astronomy, and philosophy. We don't have a known portrait of Hypatia, however this fictional portrait of Hypatia by Jules Maurice Gaspard, has now become the most iconic and widely reproduced image of her. The exact date of her birth is also unknown. It could be anywhere between 350-370 AD, but we know the exact date of her death which is March 415 AD.

**Her science journey** began when Hypatia was born around 355 AD in Alexandria, a city located in northern Egypt near where the Nile River intersects the Mediterranean Sea. The city was founded by Alexander the Great in 331 BC. In Hypatia's time it was part of the Roman Empire and was a city with many different



peoples, cultures, and religions. It was famous for its trade and commerce as well as for its arts and laws.

Hypatia's father was the famous mathematician and astronomer Theon. He spent most of his time studying the works of Euclid and Ptolemy. Theon was also a poet, a teacher, and a writer. Theon is the last attested member of the Alexandrian Museum and the last Head Librarian of the Library of Alexandria. Hypatia's mother died when she was young. Some people think that Hypatia's mother was also from a family of intellectuals. During the time Theon married Hypatia's mother, there were many other marriages in Alexandria where male philosophers arranged for their children to marry the children



of their colleagues. Hypatia was raised by her father and her name comes from a Greek word meaning "highest/greatest". Some sources say she may have a brother named Epiphanius but nothing is known about him. Theon trained Hypatia in mathematics and astronomy since she was a little girl.

At this time, around 360, boys from these arranged marriages of intellectuals were educated in ways that prepared them for the intellectual careers that had become the family business. Since Theon did this for his daughter Hypatia, it may be evidence that he did not have a son. In any case, Hypatia's training in mathematics and astronomy and later in philosophy was unusual for girls at that time. Most of the daughters of these upper-class families would have had a basic introduction to proper modes of speech, usually taught by the wet nurses hired by the families to take care of their babies. Then at 7 years old, these girls would begin to study language and the rules of basic conduct. In early adolescence they would advance to grammatical training which consisted of teaching them how to read, write, and understand classical Greek. These are things girls were expected to learn so when they got married, they would be able to teach their children. Thus, the lessons Theon taught his daughter Hypatia were extraordinary. Theon must have noticed early on that his daughter had exceptional intellectual ability.

Hypatia may have started with home language instruction by a tutor and then moved directly to the school of her father Theon. She probably did her grammatical schooling there in a classroom with boys (and perhaps other girls) under the supervision of one of Theon's teaching assistants. She began her mathematical and philosophical education under her father in her late teens or early twenties. The curriculum was organized so that students worked through basic theorems and calculation techniques before they encountered any higher-level material. Hypatia was not content with only standard mathematical training. She became more capable than her father and soon developed competencies greater than his. Soon she transitioned from being a mathematics student to one of her father's colleagues. In the modern world, this transition happens when a student finishes her doctoral dissertation. In the time of Hypatia, the equivalent of a doctoral dissertation was more of a collaborative project.

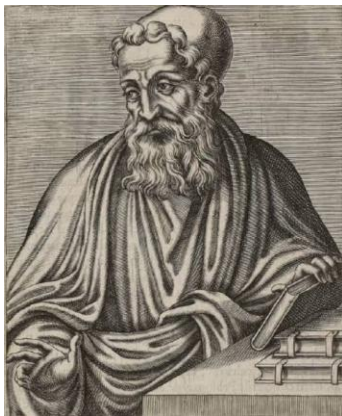
Theon is best remembered for the part he played in the preservation of Euclid's *Elements* but he also wrote extensively, commenting on Ptolemy's *Almagest* and *Handy Tables*. Hypatia continued her father's program, which was essentially a determined effort to preserve the Greek mathematical and astronomical heritage. She is credited with commentaries on Apollonius of Perga's *Conics* (geometry) and Diophantus of Alexandria's *Arithmetic* (number theory) as well as an astronomical table (possibly a revised version of Book III of her father's commentary on the *Almagest*).

By the time she turned thirty, Hypatia had already established herself as a formidable intellectual force in Alexandria. She was Theon's best student and stood out as the most promising mathematician in the city. She also developed a sophisticated understanding of contemporary trends in philosophy. She told her students to combine the mathematical rigor characteristic of the teaching of mathematicians like Pappus and Theon with the philosophical system of the Neoplatonists Plotinus and Porphyry. In the mid-380s, Theon gave the role of primary instructor at his school to Hypatia. Then Theon stepped back and became an emeritus professor.

The school began to offer much more comprehensive instruction in the teaching of Plato, Aristotle, and other philosophers. Her decision to teach both mathematics and higher-level philosophical texts in the same school, let Hypatia teach both

students who only wanted basic training in mathematics and those students who wanted a deeper, more integrated mathematical and philosophical education. She followed the mathematical curriculum of her father Theon. But she also based her philosophical teaching on the works of the Neoplatonists Porphyry and Plotinus. Neoplatonism is a philosophical movement that emerged in the 3rd century AD, building upon Plato's ideas and evolving into a distinct school of thought. It's often characterized by its monistic view of reality, where all existence emanates from a single, ultimate principle known as "The One". If you lived a life of contemplation, you could work to get closer to "The One". According to Hypatia's Neoplatonism, people should pursue a scale of virtues, from physical to political, that could "purify" your soul. Her philosophy taught that Platonic virtues guide people towards wise, just, brave, and temperate behavior.

Hypatia had many students from all over Alexandria and the Roman Empire. One



of the most famous students of Hypatia was Synesius of Cyrene who later became the bishop of Ptolemais. It is through him that we learned that Hypatia convened an inner circle of students to which access was restricted. This was the group that became most familiar with her philosophical system. Synesius was a student of Hypatia from 390 until 395. He called Hypatia his spiritual and intellectual mother. He had written 156 letters to Hypatia from the time he left school in late 395 until his death in

413.

Hypatia taught pagans and Christians alike in her school. Although she herself was a pagan she accepted students from all religions. As a teacher, she gave lectures in her home, in lecture halls, and in public. At that time, teaching to any group in public was very unusual for a woman. Public halls were filled with students and officials wanting to hear her lectures. Many of her students became important political and religious leaders and many of her ideas and teachings became widespread. She encouraged her students to engage in sound logic and rational thought. She never married and remained celibate throughout her life, devoting herself to learning and teaching.



At that time, the Patriarch of Alexandria was Theophilus. He was a powerful bishop who wanted to drive paganism out of the city. He ordered the destruction of the Serapeum, a significant temple in ancient Alexandria, dedicated to the Greco-Egyptian god Serapis. Built by Ptolemy III Euergetes, it was a major center of religious and intellectual life, known for its impressive architecture and cultural significance. But the school of Hypatia did not bother him. He even presided at the wedding of Synesius and was the one who convinced Synesius to become a bishop. He even agreed to let Synesius remain true to the philosophy Hypatia taught him while he presided over his congregation. The Patriarch, the civic elites, and philosophers like Synesius were able to work together as long as Theophilus was alive.



Theophilus had been grooming his brother's son Cyril to succeed him, but



Theophilus died in 412 before Cyril had consolidated enough support to make the transition easily and with no opposition. Because of his illness, Theophilus neglected some of the affairs of the church. Timothy, an archdeacon in the Alexandrian church, organized a challenge to Cyril. After the death of Theophilus, supporters of Cyril and Timothy fought in the streets. The fighting continued for three days until Abundantius, the military commander of the imperial troops based in Egypt, came and helped Cyril defeat his enemies. After the fighting, Novatian Christian leaders in Alexandria expressed their support for Timothy. Soon after he

secured power, Cyril punished the people who tried to meddle in his succession. He targeted the Novatians first. He closed the churches of the Novatians in

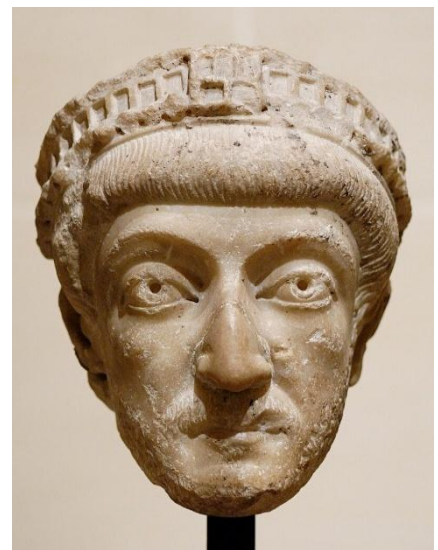
Alexandria, confiscated all the sacramental vessels they used in services, and stripped their bishop Theopemptus of all his property.

In 414, a new round of violence erupted in Alexandria. This was caused by a show put on by a group of dancers. The governor, Orestes, published an imperial edict regulating dancing performances. A Christian teacher named Hierax, a strong supporter of Cyril, very loudly and publicly applauded this new edict. When Hierax appeared at a dance performance in the theater the following Saturday after the edict was published, the largely Jewish crowd suspected that Cyril has sent him to stir up trouble. Orestes shared that suspicion, so he ordered the arrest of Hierax and had him tortured publicly in the theater.

Because Cyril had already suspected that the Jewish community had supported his rival Timothy, Cyril saw the arrest of Hierax as a challenge to his power. He summoned the Jewish leaders of Alexandria to a meeting and threatened to punish them personally if they did not stop the Jewish attacks on Christians. This terrified the Jewish community! While they had called for the punishment of Hierax, it was actually Orestes who had ordered the arrest and torture of Hierax. The Jewish community's response to Cyril was violent indignation. They hatched a plan to massacre Christians by calling out that the main church in Alexandria was on fire and then killing those Christians who rushed to put out the fire.

The next morning Cyril assembled a large group of his own followers and counterattacked. His supporters seized Jewish synagogues, stole the possessions of the Jews thought to be involved in the previous night's violence and drove them from the city.

The Jewish-Christian violence posed a different problem to Orestes. His primary responsibility as governor was to keep Alexandria under control. His decision about regulating the dance performances had backfired and caused a riot. With the city slipping out of control he sent a report to the child emperor Theodosius II. Cyril also sent a message. While the two messages traveled to Constantinople, Cyril's supporters asked him to reconcile with Orestes. Orestes turned down a request for negotiations with Cyril. Cyril came to Orestes with



Emperor Theodosius II

the Gospels in his hand. He thought that respect for religion may persuade Orestes to reconcile. But since Orestes had been baptized by the Patriarch of Constantinople, he didn't think a bishop in Alexandria had any kind of authority over government officials in Alexandria. Cyril then called 500 monks from the monasteries of Nitria to Alexandria. These monks were not the peaceful kind we know today; they were devoted followers of Cyril who would not hesitate to take to the streets. When they entered the city, they surrounded the chariot of Orestes and began to call him a pagan and an idolater. The monks were supposed to warn Orestes to the danger of confronting Cyril and convince him to make a deal with Cyril. But some of the monks did not understand the role they were supposed to play. One of them, Ammonius, got carried away and threw a stone at Orestes' head. Orestes started bleeding and was saved only when a crowd of Alexandrians took him to safety.

Cyril did not plan or sanction a physical attack on the governor; Ammonius had acted on his own. Orestes had Ammonius arrested and tortured so severely that Ammonius died from the torture. Cyril decided to write a report to the emperor with own version of events. Then he took to the pulpit and declared that Ammonius was a martyr whose defense of Christian piety led to him to being killed by the governor.

Most members of Cyril's congregation did not accept this version. They knew Ammonius suffered this punishment because he was rash and threw a stone at the governor. The governor himself felt that reconciliation with Cyril is not going to happen. He reached out to the Alexandrian elites for help and turned to Hypatia to build a coalition. Hypatia seems to have been a neutral person in this case. As a pagan she had not taken sides in the disagreement between Cyril and Timothy. Hypatia and Orestes met regularly in her home following Ammonius' attack. After a time, they were joined by other elites in Alexandria. Not long after, Orestes and other leading Christians in Alexandria stopped attending services at which Cyril presided. Cyril soon became jealous of the crowds who went to Hypatia's house.

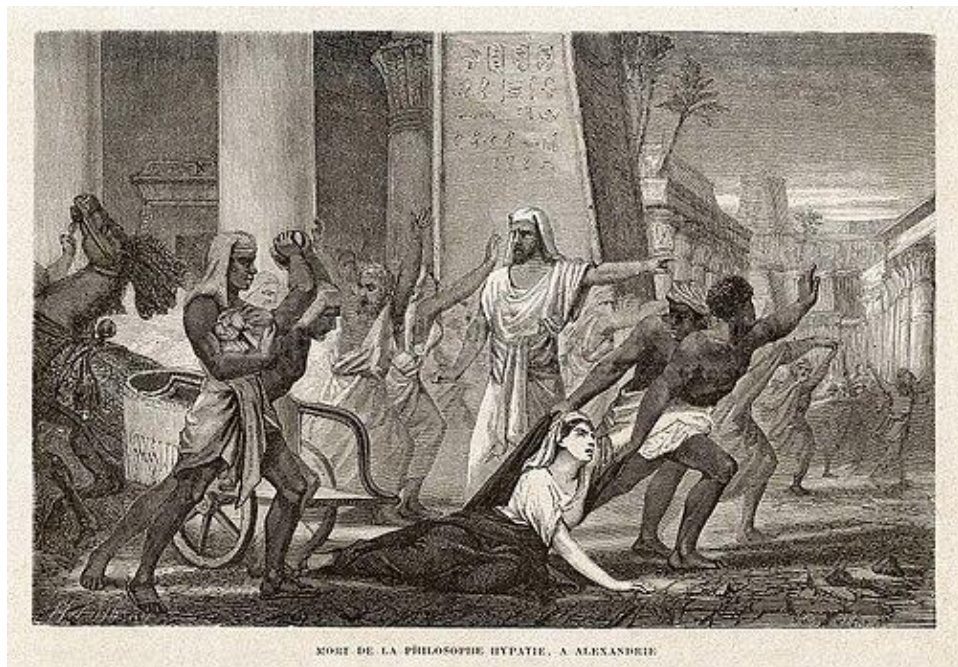
A rumor began to spread that Hypatia had bewitched Orestes through some strange combination of Pythagorean music, astrolabes, and magic. They noted that Orestes had stopped attending church and that many of the leading Christians in Alexandria had also stopped attending services. Hypatia had nothing to do with these things. It



was anger at Ammonius being declared a martyr that made these people stop attending church. Cyril's supporters also thought Hypatia was advising Orestes not to reconcile with Cyril.

A group of Cyril's supporters led by a man named Peter, a lector, decided to confront Hypatia in March 415. March is a time when some workers in Alexandria are having a difficulty. The Mediterranean sailing season had not yet opened and many of the men who worked in the harbor had no steady work and no steady income. Citizens of Alexandria had access to grain provided by the city, but that benefit wasn't available to those who came from the countryside to work. They depended on the Patriarch for sustenance. Other workers in the city, like the *parabalani* that the Cyril hired to work in the hospitals, also depended on him. The *parabalani* were members of a brotherhood, who in early Christianity voluntarily undertook the care of the sick and the burial of the dead. They usually came from the lower strata of society and also functioned as attendants to local bishops. Sometimes bishops used them as bodyguards when there were violent clashes with the bishop's opponents. The number of people dependent on Cyril made it easy for Peter to recruit people to go with him and find Hypatia. They probably did not intend to kill

Hypatia but just wanted to intimidate her and stop her from advising Orestes. Unfortunately, they found Hypatia in public, either while she was teaching or returning



home in her carriage. If she had been behind the walls of her house, it was unlikely that they would have broken in and seized her. In public, she was unprotected and easily surrounded by the mob. Hypatia was dragged through the street and taken to



the Caesareum church along Alexandria's waterfront. They stripped her clothes and tore her body apart with broken roof tiles or oyster shells (the ancient translations were not very clear)<sup>1</sup>. They even cut out her eyeballs. Her mangled remains were taken to the Cynaron where her body parts were burned. This killing was done following an old Alexandria tradition that the vilest criminals would be dragged through the city and cremated beyond the city limits. This served as a symbolic purification of the city. If Peter and his followers believed that Hypatia had been using magic to control the governor, then they would have felt they had succeeded in getting rid of pagan pollution by burning the body of Hypatia.

We know about this murder of Hypatia because it was described by Socrates Scholasticus, the Christian historian and a contemporary of Hypatia, in his book *Historia Ecclesiastica*. It is because of him that Hypatia is the earliest female mathematician about whom detailed information has survived.

Almost no one believed this story! Hypatia's murder horrified people across the empire. People could not believe that an accomplished, well respected, and renowned philosopher was murdered! No one blamed the murder on Cyril, but everyone agreed that Cyril was ultimately responsible for this attack. He created the hostile environment that eventually ended in the murder of Hypatia.

The Council in Alexandria was alarmed by the murder and sent an emissary to Constantinople. The advisors of Theodosius II launched an investigation to determine the role of Cyril in the murder of Hypatia. The investigation resulted in an edict in 416 issued by the emperors Honorius and Theodosius II which attempted to remove the *parabalani* from Cyril's power and instead place them under Orestes. The edict restricted the *parabalani* from attending "any public spectacle" or entering "the meeting place of a municipal council or a courtroom". It also severely restricted their recruitment by limiting the number of *parabalani* to no more than 500. Cyril managed to escape a more serious punishment by bribing one of Theodosius' officials. Two years later, Cyril overturned the law placing the *parabalani* under Orestes and by the early 420s, Cyril dominated the Alexandrian council. He was the Patriarch of Alexandria from 412-444. He was a prolific writer about the teachings of the church. In 430 he was embroiled in an argument with

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<sup>1</sup> The Greek word is ostrakois which literally means "oystershells," but the word was also applied to brick tiles used on the roofs of houses.

Nestorius, Patriarch of Constantinople, who was preaching that Mary was not the Mother of God since Christ's divinity is distinct and separate from his humanity. Consequently, he taught, the word theotokos (God-bearer) should not be applied to her. Cyril persuaded Pope Celestine I to convene a synod at Rome, which condemned Nestorius. Then he did the same at his own synod in Alexandria. Nestorius was forced into exile. Cyril was not officially canonized through a formal process but was widely revered as a saint by the Eastern Orthodox Church and the Coptic Church and later declared a Doctor of the Church by Pope Leo XIII in 1883. He died in 444 and is known as St. Cyril of Alexandria.

Hypatia's death created a vacuum in Alexandria's intellectual life. Since she did not have a husband or children who could take over for her, Alexandria's intellectual life began to drift after her death.

Hypatia continues to inspire people 1600 years after her death. She had become a symbol of courage, learning, and intellectual freedom. At a time when most girls did not receive an extensive education, she studied and taught mathematics, astronomy, and philosophy. In a time and place where most women felt public life should be avoided, Hypatia became a celebrated public figure. In an era when few women even considered a profession, she had an academic career as a mathematician, astronomer, philosopher, teacher and scholar.

## **HER LEGACY**

Hypatia would be remembered as the first woman to make a substantial contribution to the development of mathematics. Her notes on mathematics and astronomy helped modern mathematicians and astronomers come up with advanced theories that are still used today.

As a female intellectual, Hypatia became a role model for modern intelligent women. Two feminist journals were named after her: the Greek journal *Hypatia: Feminist Studies* was launched in Athens in 1984, and *Hypatia: A Journal of Feminist Philosophy* in the United States in 1986. In the United Kingdom, the Hypatia Trust maintains a library and archive of feminine literary, artistic, and scientific work and sponsors the Hypatia-in-the-Woods women's retreat in Washington State in the United States.

Judy Chicago's large scale art piece *The Dinner Party* has a table setting for Hypatia. The table runner depicts Hellenistic goddesses weeping over the death of Hypatia.

In 2009, the film *Agora* directed by Alejandro Amenabar and starring Rachel Weisz as Hypatia was a fictionalized dramatization of Hypatia's final years.

In 2015, the planet designated Iota Draconis b was named after Hypatia.

In 2019, in the TV series *The Good Place* Season 4 Episode 12, Hypatia was played by Lisa Kudrow as one of the few ancient philosophers eligible for heaven by not having defended slavery.

There were four videos about Hypatia and her death.

[https://www.youtube.com/watch?v=SselOJQd2\\_4](https://www.youtube.com/watch?v=SselOJQd2_4)

<https://www.youtube.com/watch?v=RqUy82EeBkE>

[https://www.google.com/search?sca\\_esv=882d27ba7320b5a9&udm=7&sxsrf=AH Tn8zp0hSu4rf9bSzCotlMrOuxtHIZkEw:1745799663294&q=hyp](https://www.google.com/search?sca_esv=882d27ba7320b5a9&udm=7&sxsrf=AH Tn8zp0hSu4rf9bSzCotlMrOuxtHIZkEw:1745799663294&q=hyp)

[https://www.google.com/search?gs\\_ssp=eJzj4tZP1zc0MrQoSjMwMWD0Ys-oLEgsyUwEAEIVBIU&q=hypatia&oq=hypati&gs\\_lcrp=EgZjaHJvbWUqDA](https://www.google.com/search?gs_ssp=eJzj4tZP1zc0MrQoSjMwMWD0Ys-oLEgsyUwEAEIVBIU&q=hypatia&oq=hypati&gs_lcrp=EgZjaHJvbWUqDA)

Other videos about the life of Hypatia include the following:

[https://www.youtube.com/watch?v=gQ5\\_ohn3fP0](https://www.youtube.com/watch?v=gQ5_ohn3fP0)

<https://www.youtube.com/watch?v=mdbf7hrlF20>

[https://www.youtube.com/watch?v=9Mn\\_wqKdUUA](https://www.youtube.com/watch?v=9Mn_wqKdUUA)

<https://www.youtube.com/watch?v=n1mwZrVJ-TI>

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## HER SCIENCE JOURNEY

355 - Hypatia was born in Alexandria

375 - Started her mathematical and philosophical education from her father Theon

385 - Considered one of the intellectuals in Alexandria, Hypatia became the primary instructor at Theon's school

390 - Synesius became one of Hypatia's students

395 - Synesius left the school of Hypatia and started sending her letters

412 - Theophilus died and made Cyril his successor. Cyril was challenged by Timothy

413 - Synesius died

414 - Orestes and Cyril started their disputes

415 - Death of Hypatia

416 - Edict from the emperors placing the *parabalani* under Orestes

418 - Cyril overturned the law placing *parabalani* under Orestes

420 - Cyril dominated the Alexandrian council

430 - Cyril and Nestorius argued about the word *theotokos* (God-bearer)

444 - Death of Cyril

1882 - Pope Leo XIII declared Cyril a Doctor of the Church

1984 - The Greek journal *Hypatia: Feminist Studies* was launched in Athens

1986 - *Hypatia: A Journal of Feminist Philosophy*

2009 - The movie *Agora* starring Rachel Weisz came out

2015 - The planet designated Iota Draconis b was named after Hypatia

2019 - TV series *The Good Place* Season 4 Episode 12, Hypatia was played by Lisa Kudrow as one of the few ancient philosophers eligible for heaven by not having defended slavery.



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