



# Dogecoin

**Dogecoin** (<sup>i</sup>ˈdoʊ(d)ʒkɔɪn/ *DOHJ-koy*n or *DOHZH-koy*n,<sup>[2]</sup> Abbreviation: **DOGE**; sign: **Ð**) is a cryptocurrency created by software engineers Billy Markus and Jackson Palmer, who decided to create a payment system as a joke, making fun of the wild speculation in cryptocurrencies at the time.<sup>[3]</sup> It is considered both the first "meme coin", and more specifically the first "dog coin". Despite its satirical nature, some consider it a legitimate investment prospect. Dogecoin features the face of Kabosu from the "doge" meme as its logo and namesake.<sup>[4][5][6]</sup> It was introduced on December 6, 2013, and quickly developed its own online community, reaching a peak market capitalization of over US\$85 billion<sup>[a]</sup> on May 5, 2021.<sup>[7]</sup> As of 2021, it is the sleeve sponsor<sup>[b]</sup> of Watford Football Club.<sup>[8]</sup>

Dogecoin.com promotes the currency as the "fun and friendly Internet currency", referencing its origins as a "joke".<sup>[9]</sup> Software engineers Billy Markus and Jackson Palmer launched the satirical cryptocurrency as a way to make fun of Bitcoin and the many other cryptocurrencies boasting grand plans to take over the world. With the help of Reddit, the site became an instant hit. Within two weeks, Dogecoin had established a dedicated blog and forum, and its market value reached \$8 million, once jumping to become the seventh largest electronic currency in the world.<sup>[10]</sup>

## History

Originally formed as a "joke",<sup>[11]</sup> Dogecoin was created by IBM software engineer Billy Markus and Adobe software engineer Jackson Palmer. They wanted to create a peer-to-peer digital currency that could reach a broader demographic than Bitcoin. In addition, they wanted to distance it from the controversial history of other coins.<sup>[12]</sup> Dogecoin was officially

## Dogecoin



Official logo

### Denominations

<b>Symbol</b>	<span>Ð</span>
<b>Code</b>	DOGE

### Development

<b>Original author(s)</b>	Billy Markus, Jackson Palmer
<b>Initial release</b>	December 6, 2013
<b>Development status</b>	Active
<b>Operating system</b>	<span>Microsoft Windows</span> , <span>Linux</span> , <span>iOS</span> , <span>Android</span>
<b>Developer(s)</b>	Billy Markus ("Shibetoshi Nakamoto"), Michi Lumin, Ross Nicoll
<b>Source model</b>	<span>FOSS</span>
<b>License</b>	<span>MIT License</span> <sup>[1]</sup>

### Ledger

<b><span>Timestamping scheme</span></b>	Proof-of-work
<b>Hash function</b>	Scrypt-based
<b>Block reward</b>	Ð10,000
<b>Block time</b>	1 minute
<b>Block explorer</b>	<span>https://dogechain.info/</span>
<b>Supply limit</b>	Unlimited Exactly Ð5 billion will enter circulation each year.

launched on December 6, 2013, and within the first 30 days, there were over a million visitors to Dogecoin.com.<sup>[13]</sup>

Valuation	
<b>Exchange rate</b>	Floating (very volatile)
Website	
<b>Website</b>	<a href="https://dogecoin.com/">https://dogecoin.com/</a>

Palmer is credited with making the idea a reality. At the time, he was a member of the Adobe marketing department in Sydney, Australia.<sup>[14]</sup> Palmer had purchased the domain Dogecoin.com and added a splash screen, which featured the coin's logo and scattered Comic Sans text. Markus reached out to Palmer after seeing the site, and started efforts to develop the currency. Markus designed Dogecoin's protocol based on existing cryptocurrencies Luckycoin and Litecoin,<sup>[15]</sup> which use scrypt technology in their proof-of-work algorithm.<sup>[16]</sup> The use of scrypt means that miners cannot use SHA-256 bitcoin mining equipment, and instead must use dedicated field-programmable gate array and application-specific integrated circuit devices for mining which are known to be more complex to produce.<sup>[17][18]</sup>

On December 19, 2013, Dogecoin jumped nearly 300% in value in 72 hours, rising from \$0.00026 to \$0.00095,<sup>[19]</sup> with a volume of billions of Dogecoins traded per day. This growth occurred during a time when Bitcoin and many other cryptocurrencies were reeling from China's decision to forbid Chinese banks from investing in the Bitcoin economy.<sup>[15]</sup> Three days later, Dogecoin experienced its first major crash when its price dropped by 80% due to this event and to large mining pools exploiting the small amount of computing power required at the time to mine Dogecoin.<sup>[20]</sup>

On December 25, 2013, the first major theft of Dogecoin occurred when millions of coins were stolen during a hack on the online cryptocurrency wallet platform Dogewallet.<sup>[21]</sup> The hacker gained access to the platform's filesystem and modified its send/receive page to send any and all coins to a static internet protocol address.<sup>[22][23]</sup> This hacking incident spiked tweets about Dogecoin, making it the most mentioned altcoin on Twitter at the time, although it was in reference to a negative event. To help those who lost funds on Dogewallet after its breach, the Dogecoin community started an initiative named "SaveDogemas" to help donate coins to those who had them stolen. Approximately one month later, enough money was donated to cover all of the coins that were stolen.<sup>[24]</sup>

In January 2014, the trading volume of Dogecoin briefly surpassed that of all other cryptocurrencies combined. However, its market capitalization remained substantially behind that of Bitcoin. Initially, Dogecoin featured a randomized reward that is received for each mining block. However, in March 2014, this behaviour was updated to a static block reward.<sup>[25]</sup> Co-founder Jackson Palmer left the cryptocurrency community in 2015 and has no plans to return, having come to the belief that cryptocurrency, originally conceived as a libertarian alternative to money, is fundamentally exploitative and built to enrich its top proponents. His co-founder, Billy Markus, agreed that Palmer's position was generally valid.<sup>[26][27]</sup>

During the 2017 to early 2018 cryptocurrency bubble, Dogecoin briefly reached a peak of \$0.017 on January 7, 2018, putting its total market capitalization near \$2 billion.

In July 2020, the price of Dogecoin spiked following a TikTok trend aimed at getting Dogecoin to \$1.<sup>[28]</sup>

On May 9, 2021, SpaceX announced a rideshare mission to the Moon completely funded by Dogecoin, thus becoming the first space mission funded by a cryptocurrency. Elon Musk confirmed this news via Twitter.<sup>[29]</sup> DOGE-1, a CubeSat, was planned to be a minor 40 kg rideshare payload on Intuitive

Machines' IM-1 mission in Q1 2022,<sup>[30][31][32][33][34]</sup> but ultimately was delayed to a potential later mission.

On August 14, 2021, the Dogecoin Foundation announced the "re-establishment of the Dogecoin Foundation (est 2014), with a renewed focus on supporting the Dogecoin Ecosystem, Community and promoting the future of the Dogecoin Blockchain."<sup>[35]</sup> The Foundation was reinvigorated by the addition to its Board of notable advisors such as Vitalik Buterin (Ethereum co-founder and inventor) and Jared Birchall (representing Elon Musk).<sup>[36][37][38]</sup>

## 2021 boom

In January 2021, Dogecoin went up over 800% in 24 hours, reaching \$0.07, as a result of attention from Reddit users, partially encouraged by Elon Musk and the GameStop short squeeze.<sup>[39]</sup> In February 2021, Dogecoin hit a new high price of \$0.08 following Twitter encouragement from Musk, Snoop Dogg and Gene Simmons.<sup>[40]</sup> In March 2021, Dallas Mavericks owner Mark Cuban announced his NBA team would allow purchasing tickets and products with Dogecoin; within two days, Cuban had declared his franchise had become the top Dogecoin merchant, having carried out 20,000 transactions.<sup>[41]</sup>

In April 2021, Dogecoin and other cryptocurrencies surged, stimulated in part by the direct listing for cryptocurrency exchange Coinbase on April 14, although that platform did not provide trading of Dogecoin.<sup>[42]</sup> Dogecoin first reached \$0.10 on April 14,<sup>[43]</sup> before hitting a new high of \$0.45 on April 16 (up 400% that week<sup>[44]</sup>), with a volume of nearly \$70 billion traded in the preceding 24 hours.<sup>[45]</sup> At the time, Dogecoin's market capitalization approached \$50 billion, making it the fifth-highest-valued cryptocurrency;<sup>[46]</sup> its value had increased more than 7,000% per year to-date.<sup>[45]</sup> Interest in Dogecoin contributed to an outage in electronic trading platform Robinhood's cryptocurrency system on April 15, caused by "unprecedented demand", and prompted concerns from experts of a nearing speculative bubble in the cryptocurrency market.<sup>[44]</sup>

On May 4, 2021, the value of Dogecoin first surpassed the symbolic hurdle of \$0.50.<sup>[47]</sup>

In April 2023, a Dogecoin increase was attributed to Elon Musk temporarily changing the logo on the Twitter app to a Doge logo.<sup>[48]</sup> In June 2023, Musk was accused of insider trading by investors based on a series of stunts including the change of logo.<sup>[49]</sup>

On August 29, 2024, Elon Musk and his electric vehicle company Tesla won the dismissal of a federal lawsuit accusing them of defrauding investors by hyping the cryptocurrency dogecoin and conducting insider trading, causing billions of dollars of losses.<sup>[50]</sup>

## Use and exchanges

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Dogecoin is an altcoin<sup>[c]</sup> with a large userbase, and is traded against both fiat currencies and other cryptocurrencies on several reputable cryptocurrency exchanges and retail investment platforms.

Trading physical, tangible items in exchange for Dogecoin takes place on online communities such as Reddit and Twitter, where users in such circles frequently share cryptocurrency-related information.<sup>[5][51][52]</sup>

Several cases of people using their employers' or universities' computers to mine Dogecoin have been discovered.<sup>[53][54]</sup>

Dogecoin has been used in an attempted property sale,<sup>[55]</sup> and it has been used in the pornography<sup>[56]</sup> and gambling<sup>[d]</sup> industries.

## Online tipping

One major mainstream commercial application of the cryptocurrency has been Internet-based tipping systems, in which social media users tip other users for providing interesting or noteworthy content.<sup>[57]</sup>

## Dogetipbot

Dogetipbot was a cryptocurrency transaction service used on popular sites like Reddit and Twitch. It allowed users to send Dogecoins to other users through commands via Reddit comments. In May 2017, Dogetipbot was discontinued and taken offline after its creator declared bankruptcy; this left many Dogetipbot users losing their coins stored in the Dogetipbot system.<sup>[58]</sup>

## Smart contracts

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Dogecoin's blockchain cannot interact with smart contracts directly. Dogecoin can be tied to the Ethereum blockchain in order to access some decentralized finance (DeFi) instruments.

## Currency supply

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Dogecoin started with an intended supply limit of Ð100 billion, which would have been far more coins than the top digital currencies were then allowing. By mid-2015, the 100 billionth Dogecoin had been mined, with an additional Ð5 billion put into circulation every year thereafter. In February 2014, Palmer announced that the limit would not be added in the codebase in an effort to create a consistent inflation rate over time.<sup>[59]</sup>

## Mining parameters

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Dogecoin's implementation differs from its predecessors: It was originally forked from Litecoin, then refactored to Bitcoin. Dogecoin's target block time is 1 minute, as opposed to Litecoin's 2.5 minutes and Bitcoin's 10 minutes.<sup>[5]</sup>

## Fundraising

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## 2014 Winter Olympics

The Dogecoin community and foundation have encouraged fundraising for charities and other notable causes. On January 19, 2014, a fundraiser was established by the Dogecoin community to raise \$50,000 for the Jamaican Bobsled Team, which had qualified for, but could not afford to go to, the Sochi Winter Olympics. By the second day, \$36,000 worth of Dogecoin was donated and the Dogecoin to Bitcoin exchange rate rose by 50%.<sup>[60]</sup> The Dogecoin community also raised funds for a second Sochi athlete, Shiva Keshavan.<sup>[61]</sup>

## Doge4Water

In 2014, The Dogecoin Foundation, led by Eric Nakagawa, began collecting donations to build a well in the Tana river basin in Kenya for World Water Day (March 22). The campaign, in cooperation with Charity: Water, collected donations from more than 4,000 donors, including one anonymous benefactor who donated 14,000,000 dogecoin (worth approximately \$11,000 at the time), raising over US\$30,000.<sup>[62]</sup>

## NASCAR



Josh Wise's Dogecoin-sponsored Chevrolet in 2014

On March 25, 2014, the Dogecoin community successfully raised £67.8 million (around US\$55,000 at the time) in an effort to sponsor NASCAR Sprint Cup Series driver Josh Wise. Nicknamed the "Moonrocket",<sup>[63]</sup> the No. 98 car featured a Dogecoin/Reddit-sponsored paint scheme and was driven by Wise at the Aaron's 499 at Talladega Superspeedway.<sup>[64]</sup> Wise and the car were featured for nearly a minute, during which the race commentators discussed Dogecoin and the crowdfunding effort, while finishing twentieth and narrowly avoiding multiple wrecks.<sup>[65]</sup>

On May 16, 2014 Wise won a spot at the Sprint All-Star Race through an online fan vote beating Danica Patrick, largely due to the efforts of the Dogecoin Reddit community. He finished the race in fifteenth, the last car running.<sup>[66][67]</sup> Eutechnyx, the developer of the NASCAR '14 video game, added the Dogecoin car as a drivable car in a DLC pack.<sup>[67][68]</sup>

On March 2, 2021, NASCAR Xfinity Series team B. J. McLeod Motorsports announced that Dogecoin would be sponsoring the No. 99 car in the Alsco Uniforms 300 at Las Vegas alongside Springrates.<sup>[69]</sup>



Josh Wise 2015 Chevrolet DogeCoin racecar

## Criticism

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Dogecoin's origin as a "joke", which makes it the first meme coin, has made it difficult to be taken seriously by mainstream media and financial experts.<sup>[70][71]</sup> The cryptocurrency has had a long and problematic history of scams.<sup>[72][73][74]</sup> Similar to many other cryptocurrencies, Dogecoin has been described by some commentators as a form of Ponzi scheme. Critics allege that Dogecoin investors who purchased Dogecoins early on, have a large financial incentive to draw others into purchasing more

Dogecoins in order to drive the price up, therefore benefitting the early investors financially at the direct expense of later purchasers.<sup>[75]</sup> This is primarily because Dogecoin does not have a supply cap like other cryptocurrencies such as Bitcoin, which has a capped supply of 21 million coins.<sup>[76]</sup>

## Elon Musk and Dogecoin

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Elon Musk frequently uses his X platform to express his views on Dogecoin, which has led some to claim that his actions amount to market manipulation because the price of Dogecoin frequently experiences price movements shortly after his tweets. Nevertheless, because cryptocurrencies are not regulated like stocks, these actions are not illegal.<sup>[77]</sup> Musk and his promotion of Dogecoin have been criticized by Dogecoin co-founder Jackson Palmer, who called Musk a "self-absorbed grifter".<sup>[78]</sup>

Musk's first Dogecoin-related tweet occurred on December 20, 2020. Musk tweeted "One Word: Doge". Shortly after, the value of Dogecoin rose by 20%.<sup>[79]</sup> This was followed by a series of Dogecoin-related tweets by Musk in early February 2021 captioned "Dogecoin is the people's crypto" and "no highs, no lows, only Doge". Following these tweets, the value of Dogecoin rose by roughly 40%.<sup>[79]</sup>

On April 15, 2021, the price of Dogecoin rose by more than 100% after Musk tweeted an image of Joan Miró's *Dog Barking at the Moon* painting captioned "Doge Barking at the Moon",<sup>[80]</sup> a message which was taken by some as a reference to the industry slang term "to the moon",<sup>[81]</sup> meaning a hoped-for increase in a cryptocurrency's value.<sup>[82]</sup>

On May 8, 2021, Dogecoin fell as much as 29.5%, dropping to US\$0.49 during Musk's *Saturday Night Live* appearance.<sup>[83]</sup> It then rose by 11% on May 20, 2021, shortly after Musk tweeted a Doge-related meme.<sup>[84]</sup> In the same month, the price of Dogecoin was up 10% in the hours after Musk tweeted a Reddit link for users to submit proposals to improve the cryptocurrency.<sup>[85]</sup>

On December 14, 2021, Dogecoin spiked more than 20% after Musk said that Tesla will accept the currency as a means of payment for Tesla merchandise.<sup>[86][87]</sup>

On June 16, 2022, Elon Musk was named in a complaint seeking damages of \$258 billion. The complaint was filed in federal court in Manhattan by plaintiff Keith Johnson. Johnson cited Musk's repeated use of his massive social influence to promote the altcoin, which he claims artificially inflated the price.<sup>[88]</sup>

It was reported in 2013 that Musk thinks Dogecoin could be used for Twitter transactions.<sup>[89]</sup> On October 27, 2022, Elon Musk completed a deal to take Twitter private. This led to a sustained rise in Dogecoin from October 25 to October 29, with Dogecoin increasing as much as 46%.<sup>[90]</sup>





# Dark Ages (historiography)

The **Dark Ages** is a term for the Early Middle Ages (c. 5th–10th centuries), or occasionally the entire Middle Ages (c. 5th–15th centuries), in Western Europe after the fall of the Western Roman Empire, which characterises it as marked by economic, intellectual, and cultural decline.

The concept of a "Dark Age" as a historiographical periodization originated in the 1330s with the Italian scholar Petrarch, who regarded the post-Roman centuries as "dark" compared to the "light" of classical antiquity.<sup>[1][2]</sup> The term employs traditional light-versus-darkness imagery to contrast the era's supposed *darkness* (ignorance and error) with earlier and later periods of *light* (knowledge and understanding).<sup>[1]</sup> The phrase *Dark Age(s)* itself derives from the Latin *saeculum obscurum*, originally applied by Caesar Baronius in 1602 when he referred to a tumultuous period in the 10th and 11th centuries.<sup>[3][4]</sup> The concept thus came to characterize the entire Middle Ages as a time of intellectual darkness in Europe between the fall of Rome and the Renaissance, and became especially popular during the 18th-century Age of Enlightenment.<sup>[1]</sup> Others, however, have used the term to denote the relative scarcity of records regarding at least the early part of the Middle Ages.



Petrarch (1304–1374), who conceived the idea of a European "Dark Age". From *Cycle of Famous Men and Women*, Andrea di Bartolo di Bargilla, c. 1450

As the accomplishments of the era came to be better understood in the 19th and the 20th centuries, scholars began restricting the *Dark Ages* appellation to the Early Middle Ages (c. 5th–10th century);<sup>[1][5][6]</sup> today's scholars maintain this posture.<sup>[7]</sup> The majority of modern scholars avoid the term altogether because of its negative connotations, finding it misleading and inaccurate.<sup>[8][9][10][11][12]</sup> Despite this, Petrarch's pejorative meaning remains in use,<sup>[13][14][15]</sup> particularly in popular culture, which often simplistically views the Middle Ages as a time of violence and backwardness.<sup>[16][17]</sup>

## History

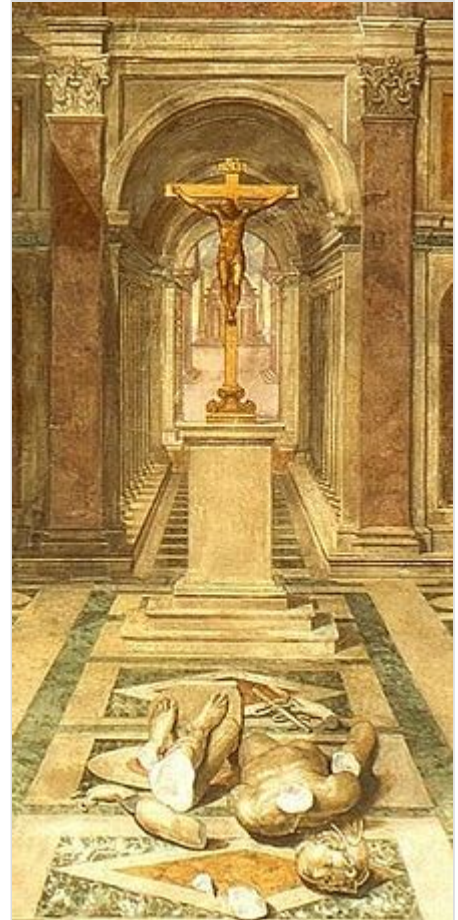
### Petrarch

The idea of a Dark Age originated with the Tuscan scholar Petrarch in the 1330s.<sup>[15][18]</sup> Writing of the past, he said: "Amidst the errors there shone forth men of genius; no less keen were their eyes, although they were *surrounded by darkness* and dense gloom".<sup>[19]</sup> Christian writers, including Petrarch himself,<sup>[18]</sup> had long used traditional metaphors of 'light versus darkness' to describe 'good versus evil'. Petrarch was the first to give the metaphor secular meaning by reversing its application. He now saw classical

antiquity, so long considered a 'dark' age for its lack of Christianity, in the 'light' of its cultural achievements, while Petrarch's own time, allegedly lacking such cultural achievements, was seen as the age of darkness.<sup>[18]</sup>

From his perspective on the Italian peninsula, Petrarch saw the Roman period and classical antiquity as an expression of greatness.<sup>[18]</sup> He spent much of his time traveling through Europe, rediscovering and republishing classic Latin and Greek texts. He wanted to restore the Latin language to its former purity. Renaissance humanists saw the preceding 900 years as a time of stagnation, with history unfolding not along the religious outline of Saint Augustine's Six Ages of the World, but in *cultural* (or secular) terms through progressive development of classical ideals, literature, and art.

Petrarch wrote that history had two periods: the classic period of Greeks and Romans, followed by a time of darkness in which he saw himself living. In around 1343, in the conclusion of his epic Africa, he wrote: "My fate is to live among varied and confusing storms. But for you perhaps, if as I hope and wish you will live long after me, there will follow a better age. This sleep of forgetfulness will not last forever. When the darkness has been dispersed, our descendants can come again in the former pure radiance."<sup>[20]</sup> In the 15th century, historians Leonardo Bruni and Flavio Biondo developed a three-tier outline of history. They used Petrarch's two ages, plus a modern, 'better age', which they believed the world had entered. Later, the term 'Middle Ages' – Latin *media tempestas* (1469) or *medium aevum* (1604), was used to describe the period of supposed decline.<sup>[21]</sup>



*Triumph of Christianity* by Tommaso Laureti (1530–1602), ceiling painting in the Sala di Constantino, Vatican Palace. Images like this one celebrate the triumph of Christianity over the paganism of Antiquity.

## Reformation

During the Reformations of the 16th and 17th centuries, Protestants generally had a similar view to Renaissance humanists such as Petrarch, but also added an anti-Catholic perspective. They saw classical antiquity as a golden time not only because of its Latin literature but also because it witnessed the beginnings of Christianity. They promoted the idea that the 'Middle Age' was a time of darkness also because of corruption within the Catholic Church, such as popes ruling as kings, veneration of saints' relics, a licentious priesthood and institutionalized moral hypocrisy.<sup>[22]</sup>

## Baronius

In response to the Protestants, Catholics developed a counter-image to depict the High Middle Ages in particular as a period of social and religious harmony and not 'dark' at all.<sup>[23]</sup> The most important Catholic reply to the Magdeburg Centuries was the Annales Ecclesiastici by Cardinal Caesar Baronius. Baronius was a trained historian who produced a work that the Encyclopædia Britannica in 1911 described as "far surpassing anything before"<sup>[24]</sup> and that Acton regarded as "the greatest history of the



Church ever written".<sup>[25]</sup> The *Annales* covered the first twelve centuries of Christianity to 1198 and was published in twelve volumes between 1588 and 1607. It was in Volume X that Baronius coined the term "dark age" for the period between the end of the Carolingian Empire in 888<sup>[26]</sup> and the first stirrings of Gregorian Reform under Pope Clement II in 1046:

"The new age (*saeculum*) that was beginning, for its harshness and barrenness of good could well be called iron, for its baseness and abounding evil leaden, and moreover for its lack of writers (*inopia scriptorum*) dark (*obscurum*)".<sup>[28]</sup>

Significantly, Baronius termed the age 'dark' because of the paucity of written records. The "lack of writers" he referred to may be illustrated by comparing the number of volumes in Migne's *Patrologia Latina* containing the work of Latin writers from the 10th century (the heart of the age he called 'dark') with the number containing the work of writers from the preceding and succeeding centuries. A minority of these writers were historians.

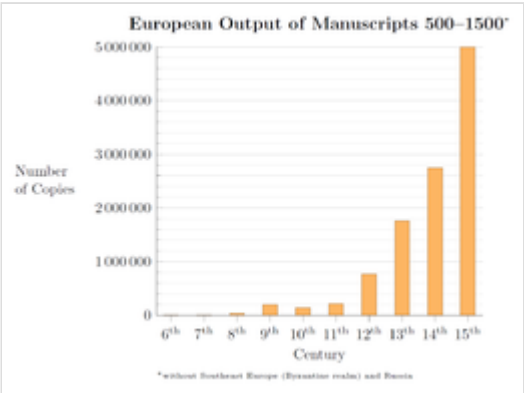
Volumes of *Patrologia Latina* per century<sup>[27]</sup>

Century	Volumes	# of volumes
7th	80–88	8
8th	89–96	7
9th	97–130	33
10th	131–138	7
11th	139–151	12
12th	152–191	39
13th	192–217	25

There is a sharp drop from 34 volumes in the 9th century to just 8 in the 10th. The 11th century, with 13, evidences a certain recovery, and the 12th century, with 40, surpasses the 9th, something that the 13th, with just 26, fails to do. There was indeed a 'dark age', in Baronius's sense of a "lack of writers", between the Carolingian Renaissance in the 9th century and the beginnings, sometime in the 11th, of what has been called the Renaissance of the 12th century. Furthermore, there was an earlier period of "lack of writers" during the 7th and 8th centuries. Therefore, in Western Europe, two 'dark ages' can be identified, separated by the brilliant but brief Carolingian Renaissance.

Baronius' 'dark age' seems to have struck historians, for it was in the 17th century that the term started to spread to various European languages, with his original Latin term *saeculum obscurum* being reserved for the period to which he had applied it. Some, following Baronius, used 'dark age' neutrally to refer to a dearth of written records, but others used it pejoratively and lapsed into that lack of objectivity that has discredited the term for many modern historians.

The first British historian to use the term was most likely Gilbert Burnet, in the form 'darker ages' which appears several times in his work during the later 17th century. The earliest reference seems to be in the "Epistle Dedicatory" to Volume I of *The History of the Reformation of the Church of England* of 1679, where he writes: "The design of the reformation was to restore Christianity to what it was at first, and to purge it of those corruptions, with which it was overrun in the later and darker ages."<sup>[30]</sup> He uses it again



Medieval production of manuscripts.<sup>[29]</sup> The beginning of the Middle Ages was also a period of low activity in copying. This graph does not include the Byzantine Empire.

in the 1682 Volume II, where he dismisses the story of "St George's fighting with the dragon" as "a legend formed in the darker ages to support the humour of chivalry".<sup>[31]</sup> Burnet was a bishop chronicling how England became Protestant, and his use of the term is invariably pejorative.

## Enlightenment

During the Age of Enlightenment of the 17th and 18th centuries, many critical thinkers saw religion as antithetical to reason. For them the Middle Ages, or "Age of Faith", was therefore the opposite of the Age of Reason.<sup>[32]</sup> Baruch Spinoza, Bernard Fontenelle, Immanuel Kant, David Hume, Thomas Jefferson, Thomas Paine, Denis Diderot, Voltaire, Marquis De Sade and Jean-Jacques Rousseau were vocal in attacking the Middle Ages as a period of social regress dominated by religion, while Gibbon in *The History of the Decline and Fall of the Roman Empire* expressed contempt for the "rubbish of the Dark Ages".<sup>[33]</sup> Yet just as Petrarch, seeing himself at the cusp of a "new age", was criticising the centuries before his own time, so too were Enlightenment writers.

Consequently, an evolution had occurred in at least three ways. Petrarch's original metaphor of light versus dark has expanded over time, implicitly at least. Even if later humanists no longer saw themselves living in a *dark* age, their times were still not *light* enough for 18th-century writers who saw themselves as living in the *real* Age of Enlightenment, while the period to be condemned stretched to include what we now call Early Modern times. Additionally, Petrarch's metaphor of darkness, which he used mainly to deplore what he saw as a lack of secular achievement, was sharpened to take on a more explicitly anti-religious and anti-clerical meaning.

## Romanticism

In the late 18th and the early 19th centuries, the Romantics reversed the negative assessment of Enlightenment critics with a vogue for medievalism.<sup>[34]</sup> The word "Gothic" had been a term of opprobrium akin to "Vandal" until a few self-confident mid-18th-century English "Goths" like Horace Walpole initiated the Gothic Revival in the arts. This stimulated interest in the Middle Ages, which for the following generation began to take on the idyllic image of an "Age of Faith". This, reacting to a world dominated by Enlightenment rationalism, expressed a romantic view of a Golden Age of chivalry. The Middle Ages were seen with nostalgia as a period of social and environmental harmony and spiritual inspiration, in contrast to the excesses of the French Revolution and, most of all, to the environmental and social upheavals and utilitarianism of the developing Industrial Revolution.<sup>[35]</sup> The Romantics' view is still represented in modern-day fairs and festivals celebrating the period with 'merrie' costumes and events.

Just as Petrarch had twisted the meaning of light and darkness, the Romantics had twisted the judgment of the Enlightenment. However, the period that they idealized was largely the High Middle Ages, extending into Early Modern times. In one respect, that negated the religious aspect of Petrarch's judgment, since these later centuries were those when the power and prestige of the Church were at their height. To many, the scope of the Dark Ages was becoming divorced from this period, denoting mainly the centuries immediately following the fall of Rome.

## Modern scholarly use

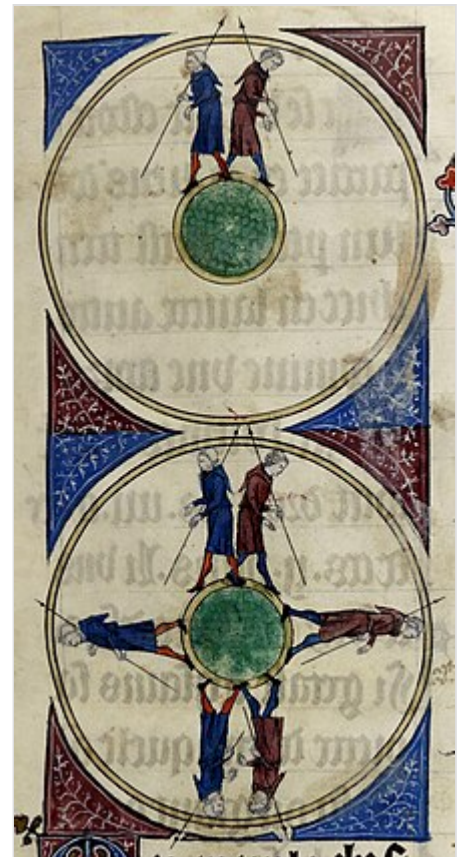
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The term was widely used by 19th-century historians. In 1860, in *The Civilization of the Renaissance in Italy*, Jacob Burckhardt delineated the contrast between the medieval 'dark ages' and the more enlightened Renaissance, which had revived the cultural and intellectual achievements of antiquity.<sup>[36]</sup> The earliest entry for a capitalized "Dark Ages" in the *Oxford English Dictionary* (OED) is a reference in Henry Thomas Buckle's *History of Civilization in England* in 1857, who wrote: "During these, which are rightly called the Dark Ages, the clergy were supreme." The OED in 1894 defined an uncapitalised "dark ages" as "a term sometimes applied to the period of the Middle Ages to mark the intellectual darkness characteristic of the time".<sup>[37]</sup> Since the Late Middle Ages significantly overlap with the Renaissance, the term 'Dark Ages' became restricted to distinct times and places in medieval Europe. Thus the 5th and 6th centuries in Britain, at the height of the Saxon invasions, have been called "the darkest of the Dark Ages".<sup>[38]</sup>

The term "Dark Ages" was increasingly questioned from the mid-twentieth century as archaeological, historical and literary studies led to greater understanding of the period.<sup>[39]</sup> In 1977, the historian Denys Hay spoke ironically of "the lively centuries which we call dark".<sup>[40]</sup> More forcefully, a book about the history of German literature published in 2007 describes "the dark ages" as "a popular if uninformed manner of speaking".<sup>[41]</sup>

Most modern historians do not use the term "dark ages" and prefer terms such as Early Middle Ages. However, when used by some historians today, the term "Dark Ages" is meant to describe the economic, political and cultural problems of the era.<sup>[42][43]</sup> For others, the term Dark Ages is intended to be neutral, expressing the idea that the events of the period seem 'dark' to us because of the paucity of the historical record.<sup>[10]</sup> For example, Robert Sallares, commenting on the lack of sources to establish whether the plague pandemic of 541 to 750 reached Northern Europe, opines that "the epithet *Dark Ages* is surely still an appropriate description of this period".<sup>[44]</sup>

However, from the later 20th century onward, other historians became critical even of this nonjudgmental use of the term for two main reasons.<sup>[10]</sup> Firstly, it is questionable whether it is ever possible to use the term in a neutral way: scholars may intend it, but ordinary readers may not understand it so. Secondly, 20th-century scholarship had increased understanding of the history and culture of the period,<sup>[45]</sup> to such an extent that it is no longer really 'dark' to modern viewers.<sup>[10]</sup> To avoid the value judgment implied by the expression, many historians now avoid it altogether.<sup>[46][47]</sup> It was occasionally used up to the 1990s by historians of early medieval Britain, for example in the title of the 1991 book by Ann Williams, Alfred Smyth and D. P. Kirby, *A Biographical Dictionary of Dark Age Britain, England, Scotland and Wales, c.500–c.1050*,<sup>[48]</sup> and in the comment by Richard Abels in 1998 that the greatness of Alfred the Great "was the greatness of a Dark Age king".<sup>[49]</sup> In 2020, John Blair, Stephen Rippon and Christopher Smart



Medieval artistic illustration of the spherical Earth in a 14th-century copy of *L'Image du monde* (c. 1246)

observed that: "The days when archaeologists and historians referred to the fifth to the tenth centuries as the 'Dark Ages' are long gone, and the material culture produced during that period demonstrates a high degree of sophistication."<sup>[50]</sup>

## Modern non-scholarly use

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A 2021 lecture by Howard Williams of Chester University explored how "stereotypes and popular perceptions of the Early Middle Ages – popularly still considered the European 'Dark Ages' – plague popular culture";<sup>[51]</sup> and finding 'Dark Ages' is "rife outside of academic literature, including in newspaper articles and media debates."<sup>[52]</sup> As to why it is used, according to Williams, legends and racial misunderstandings have been revitalized by modern nationalists, colonialists and imperialists around present-day concepts of identity, faith and origin myths i.e. appropriating historical myths for modern political ends.<sup>[52]</sup>

In a book about medievalisms in popular culture by Andrew B. R. Elliott (2017), he found "by far" the most common use of 'Dark Ages' is to "signify a general sense of backwardness or lack of technological sophistication", in particular noting how it has become entrenched in daily and political discourse.<sup>[53]</sup> Reasons for use, according to Elliott, are often "banal medievalisms", which are "characterized mainly by being unconscious, unwitting and by having little or no intention to refer to the Middle Ages"; for example, referring to an insurance industry still reliant on paper instead of computers as being in the 'Dark Ages'.<sup>[54]</sup> These banal uses are little more than tropes that inherently contain a criticism about lack of progress.<sup>[53]</sup> Elliott connects 'Dark Ages' to the "Myth of Progress", also observed by Joseph Tainter, who says, "There is genuine bias against so-called 'Dark Ages'" because of a modern belief that society normally traverses from lesser to greater complexity, and when complexity is reduced during a collapse, this is perceived as out of the ordinary and thus undesirable; he counters that complexity is rare in human history, a costly mode of organization that must be constantly maintained, and periods of less complexity are common and to be expected as part of the overall progression towards greater complexity.<sup>[16]</sup>

In Peter S. Wells's 2008 book, *Barbarians to Angels: The Dark Ages Reconsidered*, he writes, "I have tried to show that far from being a period of cultural bleakness and unmitigated violence, the centuries (5th - 9th) known popularly as the Dark Ages were a time of dynamic development, cultural creativity, and long-distance networking".<sup>[55]</sup> He writes that our "popular understanding" of these centuries "depends largely on the picture of barbarian invaders that Edward Gibbon presented more than two hundred years ago," and that this view has been accepted "by many who have read and admire Gibbon's work."<sup>[56]</sup>

David C. Lindberg, a science and religion historian, says the 'Dark Ages' are "according to wide-spread popular belief" portrayed as "a time of ignorance, barbarism and superstition", for which he asserts "blame is most often laid at the feet of the Christian church".<sup>[57]</sup> Medieval historian Matthew Gabriele





# Feudalism

**Feudalism**, also known as the **feudal system**, was a combination of legal, economic, military, cultural, and political customs that flourished in medieval Europe from the 9th to 15th centuries. Broadly defined, it was a way of structuring society around relationships derived from the holding of land in exchange for service or labour.

The classic definition, by François Louis Ganshof (1944),<sup>[1]</sup> describes a set of reciprocal legal and military obligations of the warrior nobility and revolved around the key concepts of lords, vassals, and fiefs.<sup>[1]</sup> A broader definition, as described by Marc Bloch (1939), includes not only the obligations of the warrior nobility but the obligations of all three estates of the realm: the nobility, the clergy, and the peasantry, all of whom were bound by a system of manorialism; this is sometimes referred to as a "feudal society".

Although it is derived from the Latin word *feodum* or *feudum* (fief),<sup>[2]</sup> which was used during the Medieval period, the term *feudalism* and the system it describes were not conceived of as a formal political system by the people who lived during the Middle Ages.<sup>[3]</sup> Since the publication of Elizabeth A. R. Brown's "The Tyranny of a Construct" (1974) and Susan Reynolds's *Fiefs and Vassals* (1994), there has been ongoing inconclusive discussion among medieval historians as to whether feudalism is a useful construct for understanding medieval society.<sup>[10]</sup>

## Definition

The adjective *feudal* was in use by at least 1405, and the noun *feudalism* was in use by the end of the 18th century,<sup>[4]</sup> paralleling the French *féodalité*.

According to a classic definition by François Louis Ganshof (1944),<sup>[1]</sup> feudalism describes a set of reciprocal legal and military obligations of the warrior nobility that revolved around the key concepts of lords, vassals and fiefs,<sup>[1]</sup> though Ganshof himself noted that his treatment was only related to the "narrow, technical, legal sense of the word."

A broader definition, as described in Marc Bloch's *Feudal Society* (1939),<sup>[11]</sup> includes not only the obligations of the warrior nobility but the obligations of all three estates of the realm: the nobility, the clergy, and those who lived off their labour, most directly the peasantry, which was bound by a system of



Investiture of a knight (miniature from the statutes of the Order of the Knot, founded in 1352 by Louis I of Naples)



Orava Castle in Slovakia. Medieval castles are often a traditional symbol of a feudal society.



manorialism. This order is often referred to as a *feudal society*, echoing Bloch's usage.

Outside its European context,<sup>[4]</sup> the concept of feudalism can be extended to analogous social structures in other regions, most often in discussions of feudal Japan under the *shoguns*, and sometimes in discussions of the Zagwe dynasty in medieval Ethiopia,<sup>[12]</sup> which had some feudal characteristics (sometimes called "semifeudal").<sup>[13][14]</sup> Some have taken the feudalism analogy further, seeing feudalism (or traces of it) in places as diverse as Spring and Autumn period China, ancient Egypt, the Parthian Empire, India until the Mughal dynasty and the Antebellum South and Jim Crow laws in the American South.<sup>[12]</sup>

The term *feudalism* has also been applied—often pejoratively—to non-Western societies where institutions and attitudes similar to those in medieval Europe are perceived to prevail.<sup>[15]</sup> Some historians and political theorists believe that the term *feudalism* has been deprived of specific meaning by the many ways it has been used, leading them to reject it as a useful concept for understanding society.<sup>[4][5]</sup>

The applicability of the term feudalism has also been questioned in the context of some Central and Eastern European countries, such as Poland and Lithuania, with scholars observing that the medieval political and economic structure of those countries bears some, but not all, resemblances to the Western European societies commonly described as feudal.<sup>[16][17][18][19]</sup>

## Etymology

The word *feudal* comes from the medieval Latin *feudālis*, the adjectival form of *feudum* 'fee, feud', first attested in a charter of Charles the Fat in 884, which is related to Old French *fé*, *fié*, Provençal *feo*, *feu*, *fieu*, and Italian *fio*.<sup>[20]</sup> The ultimate origin of *feudālis* is unclear. It may come from a Germanic word, perhaps *fehu* or *\*fehōd*, but these words are not attested in this meaning in Germanic sources, or even in the Latin of the Frankish laws.<sup>[20]</sup>

One theory about the origin of *fehu* was proposed by Johan Hendrik Caspar Kern in 1870,<sup>[21][22]</sup> being supported by, amongst others, William Stubbs<sup>[23][24]</sup> and Marc Bloch.<sup>[23][25][26]</sup> Kern derived the word from a putative Frankish term *\*fehu-ôd*, in which *\*fehu* means "cattle" and *-ôd* means "goods", implying "a movable object of value".<sup>[25][26]</sup> Bloch explains that by the beginning of the 10th century it was common to value land in monetary terms but to pay for it with objects of equivalent value, such as arms, clothing, horses or food. This was known as *feos*, a term that took on the general meaning of paying for something in lieu of money. This meaning was then applied to land itself, in which land was used to pay for fealty, such as to a vassal. Thus the old word *feos* meaning movable property would have changed to *feus*, meaning the exact opposite: landed property.<sup>[25][26]</sup>



Herr Reinmar von Zweter, a 13th-century Minnesinger, was depicted with his noble arms in Codex Manesse.

Archibald Ross Lewis proposes that the origin of 'fief' is not *feudum* (or *feodum*), but rather *foderum*, the earliest attested use being in *Vita Hludovici* (840) by Astronomus.<sup>[27]</sup> In that text is a passage about Louis the Pious that says *annona militaris quas vulgo foderum vocant*, which can be translated as "Louis forbade that military provender (which they popularly call "fodder") be furnished."<sup>[23]</sup>

Initially in medieval Latin European documents, a land grant in exchange for service was called a *beneficium* (Latin).<sup>[23]</sup> Later, the term *feudum*, or *feodum*, began to replace *beneficium* in the documents.<sup>[23]</sup> The first attested instance of this is from 984, although more primitive forms were seen up to one-hundred years earlier.<sup>[23]</sup> The origin of the *feudum* and why it replaced *beneficium* has not been well established, but there are multiple theories, described below.<sup>[23]</sup>

The term "féodal" was first used in 17th-century French legal treatises (1614)<sup>[28][29]</sup> and translated into English legal treatises as an adjective, such as "feodal government".

In the 18th century, Adam Smith, seeking to describe economic systems, effectively coined the forms "feudal government" and "feudal system" in his book *The Wealth of Nations* (1776).<sup>[30]</sup> The phrase "feudal system" appeared in 1736, in *Baronia Anglica*, published nine years after the death of its author Thomas Madox, in 1727. In 1771, in his book *The History of Manchester*, John Whitaker first introduced the word "feudalism" and the notion of the feudal pyramid.<sup>[31][32]</sup>

Another theory by Alauddin Samarrai suggests an Arabic origin, from *fuyū* (the plural of *fay*, which literally means "the returned", and was used especially for 'land that has been conquered from enemies that did not fight').<sup>[23][33]</sup> Samarrai's theory is that early forms of 'fief' include *feo*, *feu*, *feuz*, *feuum* and others, the plurality of forms strongly suggesting origins from a loanword. The first use of these terms is in Languedoc, one of the least Germanic areas of Europe and bordering Al-Andalus (Muslim Spain). Further, the earliest use of *feuum* (as a replacement for *beneficium*) can be dated to 899, the same year a Muslim base at Fraxinetum (La Garde-Freinet) in Provence was established. It is possible, Samarrai says, that French scribes, writing in Latin, attempted to transliterate the Arabic word *fuyū* (the plural of *fay*), which was used by the Muslim invaders and occupiers at the time, resulting in a plurality of forms – *feo*, *feu*, *feuz*, *feuum* and others—from which eventually *feudum* derived. Samarrai, however, also advises to handle this theory with care, as Medieval and Early Modern Muslim scribes often used etymologically "fanciful roots" to support outlandish claims that something was of Arabian or Muslim origin.<sup>[33]</sup>

## History

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Feudalism, in its various forms, usually emerged as a result of the decentralization of an empire: such as in the Carolingian Empire in the 9th century AD, which lacked the bureaucratic infrastructure<sup>[clarification needed]</sup> necessary to support cavalry without allocating land to these mounted troops. Mounted soldiers began to secure a system of hereditary rule over their allocated land and their power over the territory came to encompass the social, political, judicial, and economic spheres.

These acquired powers significantly diminished unitary power in these empires. However, once the infrastructure to maintain unitary power was re-established—as with the European monarchies—feudalism began to yield to this new power structure and eventually disappeared.<sup>[34]</sup>

## Classic feudalism

The classic François Louis Ganshof version of feudalism<sup>[4][1]</sup> describes a set of reciprocal legal and military obligations of the warrior nobility based on the key concepts of lords, vassals, and fiefs. In broad terms a lord was a noble who held land, a vassal was a person granted possession of the land by the lord, and the land was known as a fief. In exchange for the use of the fief and protection by the lord, the vassal provided some sort of service to the lord. There were many varieties of feudal land tenure, consisting of military and non-military service. The obligations and corresponding rights between lord and vassal concerning the fief form the basis of the feudal relationship.<sup>[1]</sup>

## Vassalage

Before a lord could grant land (a fief) to someone, he had to make that person a vassal. This was done at a formal and symbolic ceremony called a commendation ceremony, which was composed of the two-part act of homage and oath of fealty. During homage, the lord and vassal entered into a contract in which the vassal promised to fight for the lord at his command, whilst the lord agreed to protect the vassal from external forces. *Fealty* comes from the Latin *fidelitas* and denotes the fidelity owed by a vassal to his feudal lord. "Fealty" also refers to an oath that more explicitly reinforces the commitments of the vassal made during homage; such an oath follows homage.<sup>[35]</sup>

Once the commendation ceremony was complete, the lord and vassal were in a feudal relationship with agreed obligations to one another. The vassal's principal obligation to the lord was to provide aid or military service. Using whatever equipment the vassal could obtain by virtue of the revenues from the fief, the vassal had to answer calls to military service by the lord. This security of military help was the primary reason the lord entered into the feudal relationship. In addition, the vassal could have other obligations to his lord, such as attendance at his court, whether manorial, baronial, both termed court baron, or at the king's court.<sup>[36]</sup>

It could also involve the vassal providing "counsel", so that if the lord faced a major decision he would summon all his vassals and hold a council. At the level of the manor this might be a fairly mundane matter of agricultural policy, but also included sentencing by the lord for criminal offences, including capital punishment in some cases. Concerning the king's feudal court, such deliberation could include the question of declaring war. These are examples of feudalism; depending on the period of time and location in Europe, feudal customs and practices varied.

## The feudal revolution in France

In its origin, the feudal grant of land had been seen in terms of a personal bond between lord and vassal, but with time and the transformation of fiefs into hereditary holdings, the nature of the system came to be seen as a form of "politics of land" (an expression used by the historian Marc Bloch).



Homage of Clermont-en-Beauvaisis



France in the late 15th century: a mosaic of feudal territories

The 11th century in France saw what has been called by historians a "feudal revolution" or "mutation" and a "fragmentation of powers" (Bloch) that was unlike the development of feudalism in England or Italy or in Germany in the same period or later.<sup>[37]</sup> Counties and duchies began to break down into smaller holdings as castellans and lesser seigneurs took control of local lands, and (as comital families had done before them) lesser lords usurped/privatized a wide range of prerogatives and rights of the state, including travel dues, market dues, fees for using woodlands, obligations, use the lord's mill and, most importantly, the highly profitable rights of justice, etc.<sup>[38]</sup> (what Georges Duby called collectively the "seigneurie banale"<sup>[38]</sup>). Power in this period became more personal.<sup>[39]</sup>

This "fragmentation of powers" was not, however, systematic throughout France, and in certain counties (such as Flanders, Normandy, Anjou, Toulouse), counts were able to maintain control of their lands into the 12th century or later.<sup>[40]</sup> Thus, in some regions (like Normandy and Flanders), the vassal/feudal system was an effective tool for ducal and comital control, linking vassals to their lords; but in other regions, the system led to significant confusion, all the more so as vassals could and frequently did pledge themselves to two or more lords. In response to this, the idea of a "liege lord" was developed (where the obligations to one lord are regarded as superior) in the 12th century.<sup>[41]</sup>

## End of European feudalism (1500–1850s)

Around this time, rich, "middle-class" commoners chafed at the authority and powers held by feudal lords, overlords, and nobles, and preferred the idea of autocratic rule where a king and one royal court held almost all the power.<sup>[42]</sup> Feudal nobles regardless of ethnicity generally thought of themselves as arbiters of a politically free system, so this often puzzled them before the fall of most feudal laws.<sup>[42]</sup>

Most of the military aspects of feudalism effectively ended by about 1500.<sup>[43]</sup> This was partly since the military shifted from armies consisting of the nobility to professional fighters thus reducing the nobility's claim on power, but also because the Black Death reduced the nobility's hold over the lower classes. Vestiges of the feudal system hung on in France until the French Revolution of the 1790s. Even when the original feudal relationships had disappeared, there were many institutional remnants of feudalism left in place. Historian Georges Lefebvre explains how at an early stage of the French Revolution, on just one night of 4 August 1789, France abolished the long-lasting remnants of the feudal order. It announced, "The National Assembly abolishes the feudal system entirely." Lefebvre explains:

Without debate the Assembly enthusiastically adopted equality of taxation and redemption of all manorial rights except for those involving personal servitude—which were to be abolished without indemnification. Other proposals followed with the same success: the equality of legal punishment, admission of all to public office, abolition of venality in office, conversion of the tithe into payments subject to redemption, freedom of worship, prohibition of plural holding of benefices ... Privileges of provinces and towns were offered as a last sacrifice.<sup>[44]</sup>

Originally the peasants were supposed to pay for the release of seigneurial dues; these dues affected more than a quarter of the farmland in France and provided most of the income of the large landowners.<sup>[45]</sup> The majority refused to pay and in 1793 the obligation was cancelled. Thus the peasants got their land free, and also no longer paid the tithe to the church.<sup>[46]</sup>



In the Kingdom of France, following the French Revolution, feudalism was abolished with a decree of 11 August 1789 by the Constituent Assembly, a provision that was later extended to various parts of Italian kingdom following the invasion by French troops. In the Kingdom of Naples, Joachim Murat abolished feudalism with the law of 2 August 1806, then implemented with a law of 1 September 1806 and a royal decree of 3 December 1808. In the Kingdom of Sicily the abolishing law was issued by the Sicilian Parliament on 10 August 1812. In Piedmont feudalism ceased by virtue of the edicts of 7 March, and 19 July 1797 issued by Charles Emmanuel IV, although in the Kingdom of Sardinia, specifically on the island of Sardinia, feudalism was abolished only with an edict of 5 August 1848.

In the Kingdom of Lombardy–Venetia, feudalism was abolished with the law of 5 December 1861 n.º 342 were all feudal bonds abolished. The system lingered on in parts of Central and Eastern Europe as late as the 1850s. Slavery in Romania was abolished in 1856. Russia finally abolished serfdom in 1861.<sup>[47][48]</sup>

More recently in Scotland, on 28 November 2004, the Abolition of Feudal Tenure etc. (Scotland) Act 2000 entered into full force putting an end to what was left of the Scottish feudal system. The last feudal regime, that of the island of Sark, was abolished in December 2008, when the first democratic elections were held for the election of a local parliament and the appointment of a government. The "revolution" is a consequence of the juridical intervention of the European Parliament, which declared the local constitutional system as contrary to human rights, and, following a series of legal battles, imposed parliamentary democracy.

## Feudal society

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The phrase "feudal society" as defined by Marc Bloch<sup>[11]</sup> offers a wider definition than Ganshof's and includes within the feudal structure not only the warrior aristocracy bound by vassalage, but also the peasantry bound by manorialism, and the estates of the Church. Thus the feudal order embraces society from top to bottom, though the "powerful and well-differentiated social group of the urban classes" came to occupy a distinct position to some extent outside the classic feudal hierarchy.



Depiction of socage on the royal demesne in feudal England, c. 1310

## Historiography

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The idea of *feudalism* was unknown and the system it describes was not conceived of as a formal political system by the people living in the medieval period. This section describes the history of the idea of feudalism, how the concept originated among scholars and thinkers, how it changed over time, and modern debates about its use.

### Evolution of the concept

The concept of a feudal state or period, in the sense of either a regime or a period dominated by lords who possess financial or social power and prestige, became widely held in the middle of the 18th century, as a result of works such as Montesquieu's *De L'Esprit des Lois* (1748; published in English as *The Spirit of Law*), and Henri de Boulainvilliers's *Histoire des anciens Parlements de France* (1737; published in



English as *An Historical Account of the Ancient Parliaments of France or States-General of the Kingdom*, 1739).<sup>[30]</sup> In the 18th century, writers of the Enlightenment wrote about feudalism to denigrate the antiquated system of the *Ancien Régime*, or French monarchy. This was the Age of Enlightenment, when writers valued reason and the Middle Ages were viewed as the "Dark Ages". Enlightenment authors generally mocked and ridiculed anything from the "Dark Ages" including feudalism, projecting its negative characteristics on the current French monarchy as a means of political gain. For them "feudalism" meant seigneurial privileges and prerogatives. When the French Constituent Assembly abolished the "feudal regime" in August 1789, this is what was meant.<sup>[49]</sup>

Adam Smith used the term "feudal system" to describe a social and economic system defined by inherited social ranks, each of which possessed inherent social and economic privileges and obligations. In such a system, wealth derived from agriculture, which was arranged not according to market forces but on the basis of customary labour services owed by serfs to landowning nobles.<sup>[50]</sup>

## Heinrich Brunner

Heinrich Brunner, in his *The Equestrian Service and the Beginnings of the Feudal System* (1887), maintained that Charles Martel laid the foundation for feudalism during the 8th century.<sup>[51]</sup> Brunner believed Martel to be a brilliant warrior who secularized church lands for the purpose of providing *precarias* (or leases) for his followers, in return for their military service. Martel's military ambitions were becoming more expensive as it changed into a cavalry force, thus the need to maintain his followers through the despoiling of church lands.<sup>[52]</sup>

Responding to Brunner's thesis, Paul Fouracre theorizes that the church itself held power over the land with its own *precarias*.<sup>[53]</sup> The most commonly utilized *precarias* was the gifting of land to the church, done for various spiritual and legal purposes.<sup>[54]</sup> Although Charles Martel did indeed utilize *precaria* for his own purposes, and even drove some of the bishops out of the church and placed his own laymen in their seats, Fouracre discounts Martel's role in creating political change, that it was simply a military move in order to have control in the region by hoarding land through tenancies, and expelling the bishops who he did not agree with, but it did not specifically create feudalism.<sup>[55]</sup>



The Frankish domains in the time of Charles Martel (boundaries approximate), primarily modern day France, Germany, Belgium, Netherlands, Czech Republic and Austria

## Karl Marx

Karl Marx also uses the term in the 19th century in his analysis of society's economic and political development, describing feudalism (or more usually feudal society or the feudal mode of production) as the order coming before capitalism. For Marx, what defined feudalism was the power of the ruling class (the aristocracy) in their control of arable land, leading to a class society based upon the exploitation of the peasants who farm these lands, typically under serfdom and principally by means of labour, produce and money rents.<sup>[56]</sup> He deemed feudalism a 'democracy of unfreedom', juxtaposing the oppression of feudal subjects with a holistic integration of political and economic life of the sort lacking under industrial capitalism.<sup>[57]</sup>

He also took it as a paradigm for understanding the power-relationships between capitalists and wage-labourers in his own time: "in pre-capitalist systems it was obvious that most people did not control their own destiny—under feudalism, for instance, serfs had to work for their lords. Capitalism seems different because people are in theory free to work for themselves or for others as they choose. Yet most workers have as little control over their lives as feudal serfs."<sup>[58]</sup> Some later Marxist theorists (e.g. Eric Wolf) have applied this label to include non-European societies, grouping feudalism together with imperial China and the Inca Empire, in the pre-Columbian era, as 'tributary' societies.<sup>[59]</sup>

## Later studies

In the late 19th and early 20th centuries, J. Horace Round and Frederic William Maitland, both historians of medieval Britain, arrived at different conclusions about the character of Anglo-Saxon English society before the Norman Conquest in 1066. Round argued that the Normans had brought feudalism with them to England, while Maitland contended that its fundamentals were already in place in Britain before 1066. The debate continues today, but a consensus viewpoint is that England before the Conquest had commendation (which embodied some of the personal elements in feudalism) while William the Conqueror introduced a modified and stricter northern French feudalism to England incorporating (1086) oaths of loyalty to the king by all who held by feudal tenure, even the vassals of his principal vassals (holding by feudal tenure meant that vassals must provide the quota of knights required by the king or a money payment in substitution).

In the 20th century, two outstanding historians offered still more widely differing perspectives. The French historian Marc Bloch, arguably the most influential 20th-century medieval historian,<sup>[56]</sup> approached feudalism not so much from a legal and military point of view but from a sociological one, presenting in *Feudal Society* (1939; English 1961) a feudal order not limited solely to the nobility. It is his radical notion that peasants were part of the feudal relationship that sets Bloch apart from his peers: while the vassal performed military service in exchange for the fief, the peasant performed physical labour in return for protection – both are a form of feudal relationship. According to Bloch, other elements of society can be seen in feudal terms; all the aspects of life were centred on "lordship", and so we can speak usefully of a feudal church structure, a feudal courtly (and anti-courtly) literature, and a feudal economy.<sup>[56]</sup>

In contradistinction to Bloch, the Belgian historian François Louis Ganshof defined feudalism from a narrow legal and military perspective, arguing that feudal relationships existed only within the medieval nobility itself. Ganshof articulated this concept in *Qu'est-ce que la féodalité?* ("What is feudalism?", 1944; translated in English as *Feudalism*). His classic definition of feudalism is widely accepted today among medieval scholars,<sup>[56]</sup> though questioned both by those who view the concept in wider terms and by those who find insufficient uniformity in noble exchanges to support such a model.

Although Georges Duby was never formally a student in the circle of scholars around Marc Bloch and Lucien Febvre, that came to be known as the Annales school, Duby was an exponent of the *Annaliste* tradition. In a published version of his 1952 doctoral thesis entitled *La société aux XIe et XIIe siècles dans la région mâconnaise* (*Society in the 11th and 12th centuries in the Mâconnais region*), and working from the extensive documentary sources surviving from the Burgundian monastery of Cluny, as well as the dioceses of Mâcon and Dijon, Duby excavated the complex social and economic relationships among the individuals and institutions of the Mâconnais region and charted a profound shift in the social structures of medieval society around the year 1000. He argued that in early 11th century, governing

institutions—particularly comital courts established under the Carolingian monarchy—that had represented public justice and order in Burgundy during the 9th and 10th centuries receded and gave way to a new feudal order wherein independent aristocratic knights wielded power over peasant communities through strong-arm tactics and threats of violence.

In 1939, the Austrian historian Theodor Mayer subordinated the feudal state as secondary to his concept of a Personenverbandsstaat (personal interdependency state), understanding it in contrast to the territorial state.<sup>[60]</sup> This form of statehood, identified with the Holy Roman Empire, is described as the most complete form of medieval rule, completing conventional feudal structure of lordship and vassalage with the personal association among the nobility.<sup>[61]</sup> But the applicability of this concept to cases outside of the Holy Roman Empire has been questioned, as by Susan Reynolds.<sup>[62]</sup> The concept has also been questioned and superseded in German historiography because of its bias and reductionism towards legitimating the Führerprinzip.

## Challenges to the feudal model

In 1974, the American historian Elizabeth A. R. Brown<sup>[5]</sup> rejected the label *feudalism* as an anachronism that imparts a false sense of uniformity to the concept. Having noted the current use of many, often contradictory, definitions of *feudalism*, she argued that the word is only a construct with no basis in medieval reality, an invention of modern historians read back "tyrannically" into the historical record. Supporters of Brown have suggested that the term should be expunged from history textbooks and lectures on medieval history entirely.<sup>[56]</sup> In *Fiefs and Vassals: The Medieval Evidence Reinterpreted* (1994),<sup>[6]</sup> Susan Reynolds expanded upon Brown's original thesis. Although some contemporaries questioned Reynolds's methodology, other historians have supported it and her argument.<sup>[56]</sup> Reynolds argues:

Too many models of feudalism used for comparisons, even by Marxists, are still either constructed on the 16th-century basis or incorporate what, in a Marxist view, must surely be superficial or irrelevant features from it. Even when one restricts oneself to Europe and to feudalism in its narrow sense it is extremely doubtful whether feudo-vassalic institutions formed a coherent bundle of institutions or concepts that were structurally separate from other institutions and concepts of the time.<sup>[63]</sup>

The term *feudal* has also been applied to non-Western societies, in which institutions and attitudes similar to those of medieval Europe are perceived to have prevailed (see Examples of feudalism). Japan has been extensively studied in this regard.<sup>[64]</sup> Karl Friday notes that in the 21st century historians of Japan rarely invoke feudalism; instead of looking at similarities, specialists attempting comparative analysis concentrate on fundamental differences.<sup>[65]</sup> Ultimately, critics say, the many ways the term *feudalism* has been used have deprived it of specific meaning, leading some historians and political theorists to reject it as a useful concept for understanding society.<sup>[56]</sup>



# Turritopsis dohrnii

*Turritopsis dohrnii*, also known as the **immortal jellyfish**, is a species of small, biologically immortal jellyfish<sup>[2][3]</sup> found worldwide in temperate to tropic waters. It is one of the few known cases of animals capable of reverting completely to a sexually immature, colonial stage after having reached sexual maturity as a solitary individual. Others include the jellyfish *Laodicea undulata*<sup>[4]</sup> and species of the genus *Aurelia*.<sup>[5]</sup>

Like most other hydrozoans, *T. dohrnii* begin their lives as tiny, free-swimming larvae known as planulae. As a planula settles down, it gives rise to a colony of polyps that are attached to the sea floor. All the polyps and jellyfish arising from a single planula are genetically identical clones.<sup>[6]</sup> The polyps form into an extensively branched form, which is not commonly seen in most jellyfish. Jellyfish, also known as medusae, then bud off these polyps and continue their life in a free-swimming form, eventually becoming sexually mature. When sexually mature, they have been known to prey on other jellyfish species at a rapid pace. If the *T. dohrnii* jellyfish is exposed to environmental stress, physical assault, or is sick or old, it can revert to the polyp stage, forming a new polyp colony.<sup>[7]</sup> It does this through the cell development process of transdifferentiation, which alters the differentiated state of the cells and transforms them into new types of cells.

Theoretically, this process can go on indefinitely, effectively rendering the jellyfish biologically immortal,<sup>[3][8]</sup> although in practice individuals can still die. In nature, most *Turritopsis dohrnii* are likely to succumb to predation or disease in the medusa stage without reverting to the polyp form.<sup>[9]</sup>

The capability of biological immortality with no maximum lifespan makes *T. dohrnii* an important target of basic biological aging and pharmaceutical research.<sup>[10]</sup>

## Immortal jellyfish



*Turritopsis dohrnii* medusa

## Scientific classification

Domain:	<u>Eukaryota</u>
Kingdom:	<u>Animalia</u>
Phylum:	<u>Cnidaria</u>
Class:	<u>Hydrozoa</u>
Order:	<u>Anthoathecata</u>
Family:	<u>Oceaniidae</u>
Genus:	<u><i>Turritopsis</i></u>
Species:	<b><i>T. dohrnii</i></b>

## Binomial name

***Turritopsis dohrnii***  
(Weismann, 1883)<sup>[1]</sup>

## Synonyms<sup>[1]</sup>

- *Cytaeis polystyla* Will, 1844
- *Dendroclava dohrnii*  
Weismann, 1883

## Taxonomy

The species was formerly considered conspecific with *T. nutricula* before being reclassified as a separate species.<sup>[11]</sup> It was named in 1883 in honour of Anton Dohrn, the founder of the Stazione Zoologica Anton Dohrn in Naples, Italy.<sup>[12]</sup>

Until a 2006 study, it was thought that *Turritopsis rubra* and *Turritopsis nutricula* were the same species as *Turritopsis dohrnii*.<sup>[11]</sup> It is not known whether or not *T. rubra* medusae can also transform back into polyps, however further research is still to be done.

## Description

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The medusa of *Turritopsis dohrnii* is bell-shaped, with a maximum diameter of about 4.5 millimetres (0.18 in) and is about as tall as it is wide.<sup>[13][14]</sup> The mesoglea in the walls of the bell is uniformly thin, except for some thickening at the apex. The relatively large stomach is bright red and has a cruciform shape in cross section. Young specimens 1 mm in diameter have only eight tentacles evenly spaced out along the edge,<sup>[15]</sup> whereas adult specimens have 80–90 tentacles. The medusa (jellyfish) is free-living in the plankton. Dense nerve net cells are also present in the epidermis in the cap. They form a large ring-like structure above the radial canal commonly presented in cnidarians.<sup>[16]</sup>

*Turritopsis dohrnii* also has a bottom-living polyp form, or hydroid, which consists of stolons that run along the substrate and upright branches with feeding polyps that can produce medusa buds.<sup>[17]</sup> These polyps develop over a few days into tiny 1 mm medusae, which are liberated and swim free from the parent hydroid colony.

## Distribution and invasion

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*Turritopsis* is believed to have originated in the Pacific, but has spread all over the world through trans-Arctic migrations, and has speciated into several populations that are easy to distinguish morphologically, but whose species distinctions have recently been verified by a study and comparison of mitochondrial ribosomal gene sequences.<sup>[11][18]</sup> *Turritopsis* are found in temperate to tropical regions in all of the world's oceans.<sup>[14]</sup> *Turritopsis* is believed to be spreading across the world through ballast water discharge.<sup>[14]</sup> Unlike other species invasions which caused serious economic and ecological consequences, *T. dohrnii*'s invasion around the world was unnoticed due to their tiny size and innocuity.<sup>[19]</sup> "We are looking at a worldwide silent invasion", said Smithsonian Tropical Marine Institute scientist Maria Miglietta.<sup>[18]</sup>

## Life cycle

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The eggs develop in gonads of female medusae, which are located in the walls of the manubrium (stomach). Mature eggs are presumably spawned and fertilized in the sea by sperm produced and released by male medusae, as is the case for most hydromedusae. However, the related species *Turritopsis rubra* seems to retain fertilized eggs until the planula stage.<sup>[20]</sup> Fertilized eggs develop into planula larvae, which settle onto the sea floor (or even the rich marine communities that live on floating docks), and develop into polyp colonies (hydroids). The hydroids bud new jellyfishes, which are released at about one



millimetre in size and then grow and feed in the plankton, becoming sexually mature after a few weeks (the exact duration depends on the ocean temperature; at 20 °C (68 °F) it is 25 to 30 days and at 22 °C (72 °F) it is 18 to 22 days).<sup>[3]</sup> Medusae of *T. dohrnii* are able to survive between 14 °C and 25 °C.<sup>[3][15]</sup>

## Biological immortality

Most jellyfish species have a relatively fixed lifespan, which varies by species from hours to many months (long-lived mature jellyfish spawn every day or night; the time is also fairly fixed and species-specific).<sup>[21]</sup> The medusa of *Turritopsis dohrnii* is the only form known to have the ability to return to a polyp state, by a specific transformation process that requires the presence of certain cell types (tissue from both the jellyfish bell surface and the circulatory canal system).<sup>[22]</sup>

Experiments have revealed that all stages of the medusae, from newly released to fully mature individuals, can transform back into polyps under the conditions of starvation, sudden temperature change, reduction of salinity, and artificial damage of the bell with forceps or scissors.<sup>[3]</sup> The transforming medusa is characterized first by deterioration of the bell, mesoglea, and tentacles. All immature medusa (with 12 tentacles at most) then turned into a cyst-like stage and then transformed into stolons and polyps. However, about 20%-40% of mature medusa went into the stolons and polyps stage without passing the cyst-like stage. Polyps were formed after 2 days since stolons had developed and fed on food. Polyps further multiply by growing additional stolons, branches, and then polyps to form colonial hydroids. In the experiment, they would eventually transform into stolons and polyps and begin their lives once again, even without environmental changes or injury.<sup>[3]</sup>

This ability to reverse the biotic cycle (in response to adverse conditions) is unique in the animal kingdom. It allows the jellyfish to bypass death, rendering *Turritopsis dohrnii* potentially biologically immortal. The process has not been observed in their natural habitat, in part because the process is quite rapid and because field observations at the right moment are unlikely.<sup>[3]</sup> Regardless, most individual medusae are likely to fall victim to the general hazards of life as mesoplankton, including being eaten by predators or succumbing to disease.

The species possesses unique mechanisms related to telomere maintenance, which play a significant role in its regenerative abilities. *T. dohrnii* maintains telomere length through specific cellular processes during its life cycle reversal, effectively resetting cellular aging.<sup>[23][24]</sup>

The species' cell development method of transdifferentiation has inspired scientists to find a way to make stem cells using this process for renewing damaged or dead tissue in humans.<sup>[10]</sup>

## Ecology

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### Diet

*Turritopsis dohrnii* are a carnivorous species that commonly feed on zooplankton.<sup>[25]</sup> Their diet mainly consists of plankton, fish eggs and small mollusks. *T. dohrnii* ingests food and excretes waste through the mouth. *T. dohrnii* hunts by using its tentacles as it drifts through the water. Its tentacles, which contain stinging cells called nematocysts, spread and sting its prey.<sup>[26]</sup> The tentacles can then flex to direct its

prey to the mouth. *T. dohrnii*, like other jellyfish, may use its bell to catch its prey. *T. dohrnii*'s bell will expand, sucking in water, as it propels itself to swim. This expansion of the bell brings potential prey in closer reach of the tentacles.<sup>[26]</sup>

## Predation

*Turritopsis dohrnii*, like other jellyfish, are preyed on most commonly by other jellyfish. Other predators of *T. dohrnii* include sea anemones, tuna, sharks, swordfish, sea turtles, and penguins.<sup>[26]</sup> Many species prey on *T. dohrnii* and other jellyfish due to their simple composition. They are only approximately 5% non-aqueous matter, and the remaining part is composed of water.<sup>[27]</sup> They are composed of three layers. An outer layer (the epidermis), a middle layer (mesoglea; a thick, jelly-like substance), and an inner layer (gastrodermis).<sup>[27]</sup>

## Habitat

*Turritopsis dohrnii* was first discovered in the Mediterranean Sea, but has since been found worldwide.<sup>[28]</sup> *T. dohrnii* is generally found living in temperate to tropical waters. They can be found in marinas or docks, on vessel hulls, and on the ocean floor. They typically live in a salinity range of polyhaline (18–30 PSU) and euhaline (30–40 PSU).<sup>[25]</sup>

## Genomic analysis

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Genomic analyses such as sequence analysis on mRNA or mitochondria DNA have been employed to investigate its lifecycle. mRNA analysis of each life stage showed that a stage-specific gene in the medusae stage is expressed tenfold more than in other stages. This gene is relative to a Wnt signal that can induce a regeneration process upon injury.<sup>[29][30]</sup>

Analysis of nucleotide sequence homologs and protein homologs identified *Nemopsis bachei* as the species' closest relative. None of the closely related species display biological immortality.<sup>[31]</sup>

In 2022, a study reported the key molecular mechanisms of rejuvenation they found in a comparison of the newly presented genomes of this biologically immortal jellyfish and a similar but non-rejuvenating jellyfish, involving e.g. DNA replication and repair, and stem cell renewal.<sup>[32][33]</sup>

## Culturing

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Keeping *T. dohrnii* in captivity is quite difficult. Currently, only one scientist, Shin Kubota from Kyoto University, has managed to sustain a group of these jellyfish for a prolonged period of time. The plankton must be inspected daily to ensure that they have properly digested the Artemia cysts they are being fed.<sup>[7]</sup>