

“Punch and the Cusp”

&

“1991”

Essays by Thomas Pearson

to accompany the album

Jupiter's Great Hurricane

by No Spinoza

Mr. Punch is left to look after the baby, but it doesn't stop crying so he throws it out of the window. When his wife returns he lunges at her with his stick. He beats a policeman, and attacks a crocodile who tries to steal his sausages. He meets Jack Ketch, the man who killed King Charles I, and tricks him into hanging himself.

1 Finally the Devil arrives, because justice must be served: Punch is a bad apple and his place in Hell is surely guaranteed. They fight – “a terrific combat” – the Devil lands some heavy blows – but Punch eventually gains the upper hand and “knocks the breath out of his body”. Through all of this, for some reason, the audience are firmly on Punch's side. How can they be cheering for him?

This infamous glove puppet has some background. Mostly he is an adaptation of Pulcinella, one of the archetypal characters from the commedia dell'arte – a genre of Italian drama which rose to prominence in the 1500s. Along with the rest of the commedia cast, Pulcinella's personality remained consistent from play to play. The company would improvise with these familiar characters in set-piece routines, adapting them with local or topical references.

Punch inherited Pulcinella's most recognisable attributes – clownish clothes, a crooked nose, a pot belly – and like Pulcinella, who was himself a fusion of Maccus and Buccus, two contradictory characters from the ancient Roman stage, he is at times witty and silly, cunning and crass. He can be a boastful clown, an idiot, a forceful and selfish trickster. Somehow he always ends up on top.

Punch's actions are awful, but there is a strangely ethical dimension to his adventures. This might be traced to the theatrical tradition now generally known as 'morality plays' – a well-established form of medieval performance which was declining around the time the commedia was gaining popularity. Morality plays were also based on a cast of stock characters – often the personification of a universal Everyman along with figures such as Justice, Wisdom and Mercy. The Devil might also make an appearance, inevitably to be "brought to nought, or safely locked up in Hell, at the end," although it was usually his messenger Vice, representing Mankind's foibles, who had the starring role. 2

Although serious at first, Vice became the principal source of comedy – and like Pulcinella, and for similar reasons, he was a hit. Over time, however, his capers, and the Devil's, and the efforts of Everyman to withstand them, became longer, more elaborate, and rather tedious. At the early Tudor court morality plays gave way to 'interludes' which dealt with political or religious themes in a more concise and humorous way.

One important interlude, *Youth*, dates from the 1550s. It is a tale of temptation, following a young man who abandons Charity to take up with Riot before meeting Humility and finally repenting. Riot takes Vice's part; he is clearly the model for Shakespeare's Falstaff, in a play with the basic structure of *Henry IV* (1597), and in that role he swaggers into England's Renaissance society.

The popularity of Falstaff – "that trunk of humours, that bolting-hutch of beastliness, that swoll'n parcel of dropsies, that huge 3

bombard of sack, that stuff'd cloak-bag of guts, that roasted Manningtree ox with the pudding in his belly" – brought a wealth of additional material for Pulcinella/Vice's development into the classic Punch character. Indeed, when Punch appeared on the puppet stages of London and Bath before his own repertoire had taken its familiar shape, he played various roles, including Jupiter – king of the Roman gods, lord of the weather – and Falstaff himself.

4 The temptation to sin, and the corresponding risk to personal salvation – the central theme of Henry IV – was a preoccupation of the preceding centuries. The so-called Desert Fathers had been a great source of inspiration: these men, from the first years of Christianity, had retreated to the Egyptian deserts to spend their lives in spiritual contemplation. They exposed themselves to the combined trials of deprivation and nostalgia – their minds, as Belden Lane notes, "reach[ing] distractedly for everything they had abandoned at the desert's edge... recall[ing] in exquisite detail the loveliness of all they had relinquished in coming... building cities of memory on the sands of nothing."

Saint Anthony (251-356), the most important of the Desert Fathers, was said to have been tormented by the Devil for decades. His trials were a particularly popular subject for artists from 1450 to 1550 – a crucial century in the history of Western art. Their pictures seem to exist on a cusp, poised between the old and the new: on one hand, Anthony's trials are represented by demons and monsters stepping straight from the doom paintings and bestiaries of the late Middle Ages; on the other is the saint himself, whose realistic form and emotions exemplify the humanism of the dawning Renaissance.

In these pieces the saint can be encountered in a variety of ways: physically, wincing at the scratches of the beasts that assail him; psychologically, in admiration of his patience and fortitude; and emblematically, within the ranks of holy characters, representing in an abstract sense the fierce determination of the early church.

An engraving by Albrecht Dürer (1471-1528), dating from 1519, places the saint on the edge of a wealthy-looking metropolis. Unusually, there are no demons to be seen. Is it the city itself that tempts him? It is suggestive of the growing dominance of city life in the early 1500s: a time when Dürer's home of Nuremberg was thriving as a centre of manufacturing and printing, when Venice and Antwerp, visited by Dürer for study and work, were capitals of trade for the Mediterranean and the rest of the world. These were cities of enterprise and ingenuity, resounding with the ringing of bells, the loading and unloading of cargo, the hammering of artisans, "cities, like dreams... made of desires and fears." To the thinkers of the early Renaissance, surrounded by intellectual riches and architectural wonders, Anthony's rejection of urban life must have seemed all the more incredible. 5

Anthony's teachings made him the father of the monastic tradition, which flourished in the medieval period when tens of thousands of monasteries and nunneries were established in the Christian world. His ideal, however, was the true isolation of the hermit, removed even from the company of fellow monks. Joan Nuth notes that in the Middle Ages "the solitary life was considered superior to the contemplative life lived in community and, indeed, the holiest form of religious life possible." 6

Interestingly, of the many variants of hermitic practice, one of the more extreme versions actually remained embedded within the city: having metaphorically 'died to the world' in a sombre funeral-like ceremony, an anchoress would be sealed into a cell next to a parish church to live out her days in prayer. For Julian of Norwich (1342-c.1416) this allowed her mind to access places of real serenity and tenderness, to encounter the grace of God with a startling clarity. She came to perceive existence and all of creation as a tiny, delicate thing, the size of a hazelnut in her hand, shaped and protected by divine love.

This perspective must have demanded a rare empathy for her fellow citizens. From inside her cell Julian would have heard and smelled the daily activities of Norwich, then a thriving metropolis. Her thoughts would have been interrupted by people seeking advice at her window. Through these conversations she would have known the bizarreness of the city, with its accumulation of individual passions.

Julian's "shewings" – her spiritual visions – must have been intriguing to those with whom she spoke. Was the lady mad? She must have doubted herself during her long years in the anchorhold, questioning the fragility of the human mind. She will have known the superstition of the 'stone of folly' inside a person's head as the cause of delusion and dementia, and how it might be cut out: in her youth she might even have seen a performance of the operation, which was often performed as street theatre in the Low Countries where the merchants of Norwich traded regularly. A red handkerchief would spurt from the incision, a nugget would emerge, and the patient would stagger away, 'cured' and sane.

The Dutch artist Hieronymus Bosch (1450-1516) depicted a similar scene in a strange painting sometimes called *Cutting the Stone* (c.1494). A monk and a nun observe a quack doctor performing the deed on a portly seated man. The characters all carry symbols: the monk holds a communion flagon; the nun, balancing a book on her head, has a bulging purse hanging from her belt. The surgeon, lancet in hand, wears a funnel as a hat – a mysterious motif which recurs through Bosch's paintings and is thought to indicate ineptitude. "Master, cut the stone out quickly!"

But there is no stone: instead, a golden flower is pulled from the man's head. The flower has been interpreted by some as an alchemical symbol of wisdom, making the painting a satire on the vain quest for knowledge and wealth – and a critique of corruption in the Catholic church. This was another great theme as the Renaissance spread to northern Europe, where humanist thinking began demystifying the essential obscurity of medieval spirituality. The anchoritic tradition died, in England at least, along with the monasteries. Anthony's influence diminished. The established order and structures of society were giving way.

Renaissance art and thinking were increasingly infused with the aesthetics and achievements of ancient Greece and Rome, interpreted afresh as wellsprings of human reason, enlightenment and order. But the extent to which these ideas were 'rediscovered' – and, by implication, the depth of cultural darkness endured through the Middle Ages – is often overstated. The works of Ovid and Virgil had been held in high regard for medieval scholars – and were even, in the case of Virgil's Fourth Eclogue,

7 thought to predict the birth of Jesus. "O dear child of the gods,
take up your high honours: the time is near, great son of Jupiter!
See the world, with its weighty dome, bowing, earth and wide sea
and deep heavens: see how everything delights in the future age!"

The planets and stars in this "weighty dome", although a nightly source of wonder, were never successfully brought into the structures of the Christian church, and astrology was consistently the principal arena in which certain Graeco-Roman (i.e. pagan) associations were widely understood by ordinary people. It was clearly unnecessary to provide any context, even to the commoners of York, when in their pageant of 'mystery plays' (another important strand of medieval drama), first recorded as early as 1376, King Herod claimed to be stronger even than Jupiter. In the Masons' and Goldsmiths' play, number 16 of the cycle, Herod

8 boasts of throwing thunderbolts "by the thousand, whenever I like". He goes on to exercise that power in the most distressing of ways when, having been informed about the birth of Jesus by the Magi, he orders the slaughter of every baby boy in Bethlehem.

9 Umberto Eco notes that "the medieval tendency to understand the world in terms of symbol and allegory" was "the one which characterises the period above all others," while Jonathan Sawday

10 observes that "Renaissance culture... loved the idea of allegory, of working by indirection... [the] idea of something hidden, dark, mysterious, interior to the text" (emphasis added). Here we see again that there was perhaps more continuity than change: less of an obvious tipping point. Storytelling like Play 16, mixing Classical and Biblical references and metaphors, remained an important tool

for mass communication, even as rational 'Renaissance Man' took his place at the philosophical centre. There was, however, a development in emphasis and detail: depictions began to focus more overtly on recognisably human thought and form. So the archetype of Vice morphed into the more rounded personality of Falstaff; the Biblical characters on the walls of the Sistine Chapel (1512), although still combined with demons, still framed with superstition, were now strikingly lifelike.

Allegorical characters – personifying character traits, activities, geographical features, nation states and more – continued to proliferate through the cultural life of Europe until the early twentieth century. One distinctive later outlet was in the field of political satire: in England, William Hogarth (1697-1764) and his followers James Gillray (1756-1815) and George Cruikshank (1792-1878) used characters including John Bull, representing the British people, to send up the events, fashions and morals of the time. It is no coincidence that Cruikshank illustrated a set of standard Punch & Judy scripts, or that the satirical magazine *Punch*, which began publishing in 1841, was named in honour of the murderous puppet.

These days we have all but lost our sensitivity to the nested meanings of allegory and personification. The character of Jupiter, the canonical significance of Saint Anthony, the political resonance of John Bull: all are lost to us. *Punch* survives, just; his antics are reduced to pantomime routines, at most representing a certain working-class seaside heritage. But he can still remind us, if we care to look, of a way of reading messages in, through and behind things: of a more poetic and emblematic way to see the world.

Punch – Pulcinella – Falstaff – the right wing of Matthias Grünewald's *Isenheim Altarpiece* (1516, detail) with the temptation of Saint Anthony – a plan of Antwerp (1565, detail) by Virgilius Bononiensis – *Cutting the Stone* (c.1494 or later, detail) by Hieronymus Bosch – Fra Angelico's *Armadio degli Argenti* (1453, detail) with King Herod commanding the 'massacre of the innocents'; *The Last Judgement* by Michelangelo, Sistine Chapel (1512, detail), with a boatload of damned souls being discharged into hell.

Pendant of Saint Peter by an unknown artist – astrolabe in paper and wood by John Prujean (c.1680) with rule by Thomas Pearson – bronze head of Jupiter Ammon (1500s).

U.S. Air Force LTV A-7E Corsair II during the Gulf War – aerial view of One Canada Square, Canary Wharf – Stansted Airport – Ryanair BAC 1-11 – Apple Macintosh IIfx – Luciano Pavarotti in concert; burning Kuwaiti oil wells (all 1991).







The first airstrikes of Operation Desert Storm, a military operation to drive Iraqi invasion forces out of neighbouring Kuwait, began on 16 January 1991. For the next 42 days over 88,500 tonnes of bombs were dropped in an airborne offensive of astonishing ferocity, the heaviest since the Second World War. As the battered Iraqi troops retreated they set the Kuwaiti oil wells on fire: a 'scorched earth' tactic which left a catastrophic desert landscape with towers of flame and smoke. The wells burned furiously, consuming around a billion barrels of oil until being finally extinguished in November. The oil was valued at an estimated \$157.5 billion at the time; the cost of the fire crews alone came to \$1.5 billion.

Oil, and the world's addiction to it, transformed the politics of the Middle East through the twentieth century. As global demand soared, many countries in the region began earning more from oil than they could efficiently spend within their own economies. Their so-called 'petrodollars', invested in other states around the world, brought unusual new dependencies to global finance. New flows of money called for new financial instruments, new market structures, new attitudes towards wealth and where it came from.

August of 1991 saw the opening of a new monument to global finance in this Oil Age. Rising to 235m, One Canada Square was then the tallest building in the United Kingdom. It was the centrepiece of Canary Wharf, an office development built on and around the derelict West India Docks in the east of London, and the emblem of British 'dockland' regeneration.

Like many similar sites around the country, the West India Docks – an arrangement of man-made wharves and waterways dating from 1802 – had been left empty due to a combination of Second World War bombing, the collapse of colonial trade, and the advent of containerised shipping. After finally closing in 1980, they became a particular focus for the Thatcher government. They were recognised as a potential site for a new financial district: a competitor for the Square Mile, London's traditional commercial centre, just a short distance upriver. Sweeping new planning powers were introduced to stimulate the regeneration of the area.

The docks were eventually bought by the developers Olympia & York, who led the construction of the first buildings and streets. The estate was built around the old wharves, to a new kind of urban design in stark contrast to the winding medieval streets of old London. It is, in many ways, a piece of American townscape.

On the surface it seems to accept some of the principles of Robert Krier's influential book *Urban Space* (1975). Krier describes how twentieth-century modernism had jettisoned both the "original functions and [the] symbolic content" of long-established urban forms like the market place and public square, then presents a set of propositions for how some of those qualities might be rediscovered. Canary Wharf is indeed a formal arrangement of circuses and squares, with the obelisk of One Canada Square at the intersection of two axes. It is all quite Sixtus V, quite Rome c.1590 – although the open spaces are too large to feel truly 'civic', as indeed they are not. Westferry Circus, with its enormous roundabout, has the charm of a motorway junction.

American influence in London's financial sector had grown since the 'Big Bang' of 1984, bankrolled by the revenues of oil discovered close to home in the North Sea, which brought widespread deregulation, an influx of international firms, and demands for a new type of office accommodation. Old-fashioned British styles of working were swept away as new 'shell and core' construction, with flexible open-plan floor plates, became the standard for commercial buildings.

These changes came hand-in-hand with the growth of High-Tech architecture, which found an early, pure expression in the work of architects including Norman Foster (b.1935). Inspired in large part by modern technology and engineering, structures such as the Sainsbury Centre for Visual Arts in Norwich (Foster Associates, 1977) – part hangar, part fuselage, free of internal columns and endlessly reconfigurable – provided a perfect model for the new business world. Even Canary Wharf, behind its postmodernist façades, was built on the same basic logic.

12 The hangar form is itself meaningful. In a BBC documentary from 1991, Foster praised the Boeing 747 (1969) as a design classic, a masterpiece of architecture as much as engineering, which "blurs the edges between technology and building – and what's more, it flies." At the same time he bemoaned the blandness inside: "like a lot of offices, it's a fixed shell and a moveable interior, but there's a certain anticlimax... it could really be almost anywhere." This is an interesting critique from a designer who did so much to popularise the High-Tech 'shell and core' paradigm. Perhaps it reflects a development of his thinking from the empty shell of the SCVA.

Stansted Airport, to north of London, is another sleek structure enclosing a flexible space – but a significantly more sophisticated example of the type. Designed, again, by Foster Associates, it was an attempt to elevate the passenger experience: conventional airports were, Foster says, “more and more like shopping centres: a sandwich of space... lots of ducts with air-handling on the top, which cool the air, lots of electric lighting then because you’ve got no natural light... very energy-consuming, and not very nice.” Housing the ventilation equipment underground allowed the roof at Stansted to be open to sunlight: more “joyful” and more efficient. The glazed perimeter walls permitted views of the airfield and runways. It was a celebration of the technology and aesthetics of flight. 13

When Stansted opened in 1991, the European Union had nearly completed an incremental ‘liberalisation’ of its airspace. From the following year, multiple airlines would be able to operate on principal routes previously monopolised by state-owned carriers. The continent’s first low-cost airline, Ryanair, was primed to capitalise on the opportunities the new rules would bring; in May 1991 the company switched its London base to Stansted and the airport began its long association with budget holidays.

Thanks to businesses like Ryanair, movement by air has become easier, cheaper, and more casual. Small airports around the world have been transformed into international travel hubs, bringing significant investment into local economies – and huge profits to both the aviation industry and the oil companies which sustain it. With more planes in the air, to more places, the logistical complexity of commercial aviation has become immense.

In 2025 the German low-cost carrier Eurowings announced a groundbreaking research project to harness the power of quantum computing in managing and planning its operations. Quantum computers use methods of processing data based on the fundamental indeterminacy of quantum mechanics. Instead of the conventional 'bit', an simple data entity with a value of either 0 or 1, the quantum bit (or 'qubit') can hold both, or either, at the same time: its value is therefore a matter of probability. This makes quantum computing far more flexible, far better at handling large data sets – and formidably complex. Its logic is derived from the behaviour of atoms and sub-atomic particles, the fundamental building blocks of life and matter.

Although the concept of atoms had existed for many centuries, they were only definitively 'discovered' in the 1800s, followed by electrons and then protons and neutrons, the components of the nucleus, in the early twentieth century. Physicists have since explored the constituent parts of even these tiny objects, uncovering new particles, forces, and strangeness beyond comprehension: neutrinos, muons, taus, quarks of six 'flavours', photons, gluons and at least three types of boson. Particles exist in multiple states and situations simultaneously, in a cloud of possibilities, moving forwards and backwards in time. They spin, decay, combine and annihilate, looping and charging all at once.

The European Organisation for Nuclear Research, known more commonly as CERN, was established in 1954 to study these objects. In 1991 its Large Electron-Positron Collider, a circular tunnel beneath Geneva, 27 kilometres in circumference – then the largest and most powerful scientific instrument ever built – had been in

operation for two years and had already helped establish many fundamental parameters in the so-called Standard Model of quantum mechanics. Thousands of scientists were employed there to analyse new worlds of data. In response to a need for the effective sharing of information, a group of CERN staff invented the 'World Wide Web' as a system for accessing digital content across a computer network. A functioning 'browser', able to access 'web pages', was released publicly in August 1991, and a revolution in how people around the world could obtain, consume and publish information began.

Away from the heat of scientific research, electronics companies were in a race to produce computers for use in the home. The British artist David Hockney, then based in Malibu, bought an Apple Mac IIx – a variant of the company's first colour-screen model – and began to investigate methods for drawing on screen. He quickly grasped the possibilities of producing prints directly from digital images ("It raised fascinating issues. What are these pictures? They are the originals that come out. They are not, in that sense, reproductions...") and in 1991 used his Mac to 'paint' the poster for a production of Giacomo Puccini's 1924 opera *Turandot*, for which he was already working on the set design. The artificial nature of Hockney's marks is quite overt: an approach which characterises his digital works to this day. Working without hard-copy reference colours was an entirely new challenge for his printers.

14

Hockney's *Turandot* was itself timely, coming a year after one of its arias, *Nessun dorma*, shot to mainstream public success. A version sung by the tenor Luciano Pavarotti was used as title music for the BBC's coverage of the 1990 World Cup in Italy – unusually, since

15 theme tunes for sports programmes were generally “variations on the Match of the Day/Grandstand template, or occasionally borrowed from pop songs.” Its status as the unofficial soundtrack of the tournament was cemented by Pavarotti’s live performance in Rome, alongside Plácido Domingo and José Carreras, on the night before the final. The recording of this ‘Three Tenors’ concert became the biggest-selling classical record of all time.

Puccini’s opera is a pan-Asian affair. It is set in Beijing, where the beautiful Princess Turandot has sworn to never marry – unless a man can solve three apparently impossible riddles. Calaf, the Prince of Tartary, sees Turandot for the first time as she pronounces in public the death sentence of an unsuccessful suitor, the handsome Prince of Persia. It is love at first sight for Calaf, who goes on, incredibly, to pass Turandot’s test. To save herself from her own bargain Calaf offers the princess a riddle in return: she must find his name by dawn. In typically bloody fashion she declares that the members of her court will themselves be killed if the name is not found: hence “nessun dorma” – “none shall sleep”.

And we are all a bit wired now, more restless in our beds. The light emitted by the screens of computers and other devices is known to disrupt the body’s natural circadian rhythm. The use of social media, one of the World Wide Web’s most significant global applications, has been shown to have major effects on mental health; to some, including the American tech journalist Kara Swisher, it leads to an unhealthy level of dependency: she describes the “entire business plan” of the social media industry as “predicated on engagement... on virality... on enticing you and then addicting you.”

16

Personal computers and devices, with browsers which still stem from the original CERN codes, have enabled an explosion of shared information. In 2025, just thirty-four years after the first web page, the quantity of data online stands at a monumental 1,810,000,000,000,000,000,000,000 bits – and is growing still.

An infinity of images is accessible at one's fingertips, ready to be fired directly into the brain, and the temptation to look can be overwhelming. Although the freedom for creative expression in such space can seem limitless, platforms devised to navigate and curate it – run “with no appreciation of consequence” – can easily be used (and bought) for propaganda of the most insidious kind. 17

The removal of the Iraqi dictator Saddam Hussein was considered in 1991 but only enacted in 2003. The turbulence which followed allowed the rise of Islamic State, an extreme jihadist militia whose tactics included highly effective (and monstrously violent) image-making for an online audience around the world. This is just one example of how digital platforms have helped create real, physical shockwaves of conflict: rockets flying, communities devastated, cities of ancient renown – wonders of the world – left in ruins.

1991 might then be seen as a year of uncorking: of genies fizzing from bottles. The Gulf War, financial systems based on the thirst for oil, the interconnectedness of digital networks and even budget air travel have all served, in their own way, to exacerbate the instability of the world. And here we remain, in a world of oil and information, air and flight and perpetual, indeterminate motion, lights sparkling on screens, just one glorious step from the flames.

Thomas Pearson is a poet, musician

and architectural conservationist

from north-east England. His work

concerns history, buildings and places.

Notes: 1 William Judd, *The Tragical Acts, or Comical Tragedies, of Punch & Judy*, New York: Happy Hours Company, 1879; 2 John Dover Wilson, *The Fortunes of Falstaff*, Cambridge: Cambridge University Press, 1944; 3 William Shakespeare, *King Henry IV, Part I*, K.B. Potten (ed.), Glasgow: Wm. Collins Sons & Co. Ltd., 1977; 4 Belden Lane, *The Solace of Fierce Landscapes*, Oxford: Oxford University Press, 2007; 5 Italo Calvino, *Invisible Cities*, London: Vintage Classics, 1998; 6 Joan Nuth, *God's Lovers in an Age of Anxiety*, London: Darton, Longman & Todd Ltd., 2001; 7 Virgil, *Eclogue IV*, John William Mackail (trans.), London: George Pulman & Sons, Ltd., 1908; 8 *The York Cycle*, Gerard NeCastro (trans.), *From Stage to Page* (online); 9 Umberto Eco, *Art and Beauty in the Middle Ages*, New Haven: Yale University Press, 1986; 10 Jonathan Sawday, *In Our Time: Renaissance Magic*, BBC Radio 4, 17 June 2004; 11 Rob Krier, *Urban Space*, London: Academy Editions, 1991; 12 Norman Foster, *Building Sights: Boeing 747*, BBC Two, 15 January 1991; 13 Norman Foster, *Norman Foster: Striving for Simplicity*, Louisiana Channel, 1 June 2015; 14 David Hockney, *That's the way I see it*, San Francisco: Chronicle Books, 1993; 15 Philip Bernie, *The ultimate sports theme tune*, BBC Sport, Editor's Blog, 6 September 2007; 16 Kara Swisher, *Dan Snow's History Hit: The History of Social Media* (podcast), February 4, 2021; 17 Ibid. Images: Punch by unknown, Pulcinella by Adam Eastland, Falstaff by unknown, Ryanair BAC 1-11 by John Sturrock, Apple Macintosh IIfx by Roman Belogorodov, Pavarotti by Mirrorpix, burning oil well by Dennis Brack / Danita Delimont (all © Alamy); LTV A-7 Corsair II by U.S. Navy; Canary Wharf by unknown, Stansted Airport by Peter Mackinven (both © Arup); astrolabe © Museum of the History of Science, Oxford (inventory 48821); all others in the public domain.