oldest-known star chart in Europe is the Vienna manuscript. Dated to 1440 AD, it shows only a limited number of stars in northern constellations, plotted in an azimuthal projection from the ecliptic pole.

The chart may have been used to consult the heavens to predict earthly events. Astronomy was an imperial science in ancient China, and court astronomers and astrologers created star charts from at least the fifth century BC. Chinese emperors sought celestial clues for political and warfare decisions, and the importance of divination led to an early precision in star catalogues.

But why was the chart kept in the Mogao Caves rather than in the imperial archive? "It remains a mystery," says Whitfield. A political and secret document, it may have served a military purpose rather than being a guide for travellers. When the Taoist priest discovered the hidden library, he could hardly have guessed that he was opening the door to a world of such fascinating antiquity. ■

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See www.nature.com/astro09 for more on the International Year of Astronomy.

Superstition challenged

Grimoires: A History of Magic Books
by Owen Davies
Oxford University Press: 2009. 384 pp.
£14.99, $29.95

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Johann Kruse's 1950s campaign against superstition and sorcery targeted books conveying such beliefs (inset, right).

You might expect to find grimoires — collections of magic spells, recipes and charms — on the shelves of medieval mystics or in the pages of Harry Potter books. But as social historian Owen Davies shows, they are not confined to history and fantasy.

In the 1960s, for example, the German Lutheran minister Kurt Koch waged war against what he called the "flood of magical conjuration which washes the Alps", namely the superstitions he had found across southern Germany, Austria and Switzerland. To his dismay, such beliefs were promoted in cheap, mass-produced grimoires such as *The Sixth and Seventh Books of Moses* — a title that had circulated in Europe since at least the eighteenth century.

Two contrasting positions in the modern view of grimoires are personified in another dispute in Germany in the 1950s. On one side was Johann Kruse, a schoolteacher who had seen many people, including his own mother, accused of witchcraft in rural Schleswig-Holstein in northern Germany. Like Koch, he wanted to see such beliefs banished. In 1950 Kruse founded the Archive for the Investigation of Contemporary Witchcraft Superstition, and he published the exposé *Witches Among Us?* the following year. In 1956, he successfully sued the publisher Planet-Verlag for selling a cheap version of *The Sixth and Seventh Books of Moses*. Kruse's campaign seems at first like a noble attempt to combat ignorance and deceit by targeting publishers who were exploiting the gullibility of uneducated people. But such efforts often had moralistic overtones, akin to attempts to suppress pulp fiction in favour of more 'improving' literature.

On the other side of this debate were academic folklorists such as Will-Erich Peuckert, who testified for the defence against Kruse and felt that folk beliefs were a valid part of cultural tradition. Davies is refreshingly neutral, content with wry asides that leave no doubt about his views on these childish compendiums of 'magic'.

But grimoires weren't always ridiculous. Some collections of recipes and tricks from antiquity, such as the Stockholm and Leiden papyri — discovered in the 1820s and probably made in Egypt in the third century AD — provide a valuable window on the technologies of their age, describing the preparation of medicines, pigments, dyes and metals. And some 'magic' books — such as Giambattista Della Porta's *Natural Magic* (1558), which describes a camera obscura — are scientific treatises on mathematics and optics. These claim an allegiance to magic only because of the Neoplatonic view that natural magic is the mechanical system of nature, a web of hidden or occult forces.

In this regard, Davies's book disappoints. Despite offering an overview of magical tradition, he never really beds it into the history of ideas wherein magic occupies a valid pre-scientific role. One looks in vain for the sort of synoptic theses that motivate, for example, Keith Thomas's magisterial *Religion and the Decline of Magic* (Weidenfeld and Nicholson, 1971), or Norman Cohn's study of witchcraft and persecution, *Europe's Inner Demons* (Basic Books, 1975).

Most of all, there is no sense of why magical belief proves so tenacious when magic itself does not work. As anthropologist Bronisław Malinowski argued, magic ritualizes hope in an adverse world, so that one coincidental success cancels out countless failures. And as Thomas showed, religion encouraged magical belief even while competing and sometimes merging with folk superstitions. In the Middle Ages, many uneducated parish priests conducted services as arcane rituals, with an incomprehensible liturgy and the Eucharistic host wielded like a talisman or cure-all.

Magic has long been associated with experimental science, as made clear by Lynn Thorndike in his multi-volume survey of those two activities, published between 1923 and 1958. Technology often carried the suspicion of

demonic witchcraft, not least in the invention of the printing press, which is sometimes attributed to Faust instead of Johannes Gutenberg. That is one reason why grimoires can be read as practical guidebooks, such as the 'how-to' *Kunstbuchlein* of German tradition. As William Eamon showed in *Science and the Secrets of Nature* (Princeton University Press, 1994), these made a selling point of their promise of forbidden and hidden knowledge.

Davies reveals with relish just how banal this could make such 'secret' books. They might offer nothing more dangerous than cures for stomach ache and bad breath — although few plumb the Pythonesque depths of an Icelandic book from the seventeenth century with its runic spell to "afflict your belly with very great farting". By the twentieth century, the history of magic becomes a dispiriting, yet curiously compelling tale of charlatans and quacks who invented comically grandiose sects and titles. Davies deflates these with the understatement: "The Hermetic Brotherhood of Luxor was a mail order organization founded in 1884 by Peter Davidson, a Scottish violinmaker." He stops short of mentioning the flirtation of today's celebrities with vulgarized Kaballah — the point is made.

Also left implicit is Davies's analogy between popular grimoires and the modern plague of 'how-to' titles offering success in wealth or love. One can readily see that they are part of the same tradition, promising exclusive access to empty secrets. Internet magic has not diminished the desire for printed grimoires: given their fetishistic status, it seems that possession is still nine-tenths of the lore. *Grimoires* makes clear the continuity of magical belief in popular culture. Science and technology do not expel it, but merely give it new forms. ■

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The technology of illusion

Interactivos? Lima '09: Magic and Technology
Escuelab, Lima, Peru. Sponsored by Medialab Prado.
Workshop held 13 April until 13 May 2009.

Magic is not limited to the tricks performed at children's parties. It can refer to anything that resists explanation, from cognitive illusions to high-tech wizardry. This broader sense of magic was in the air in Lima, Peru, earlier this spring, when engineers and artists converged to explore the intersection of magic and technology, with awe-inspiring results.

"It's nuts, it's very ambitious," said Julian Oliver, an artist from New Zealand who helped to organize the workshop for Medialab Prado, based in Madrid, Spain. "People bring the skeletons of ideas and build them in just two weeks."

The workshop began with a digital nod to the time-honoured manipulation of playing cards and coins. Using a suitcase that folds out to become a digital overhead projector, a Spanish magician doctored a live video feed of his tabletop tricks using a pair of wireless shoes.

Other artists endowed spectators with unearthly powers. One Brazilian artist gave visitors a 'magic wand' to change the outline of their shadows. A Mexican inventor used a hidden theremin, the musical instrument that responds to the body's electrical fields, to activate a magnet that causes a pair of ghostly silver spoons to flip over when someone approached. "We had to reject a project that involved a flame you could control with your hands by way of gas injections," said Oliver.

The conception of magic in Peru was not always the art of deception seen in the West. Instead of Houdini-style illusions, "there is superstition and metaphysics" in Peru involving "rites, summoning and prognostication", said Oliver. *Abracadabra Pata*, a box in which visitors saw their own arms transformed into the legs of insects or lions, gave a taste of the spirit of witchcraft. A sense of the miraculous also pulsed through an installation that asked passers-by to synchronize their heartbeats to revive an image of a dead man projected onto the floor, in a sort of shamanistic healing-ritual-turned-video-game that took its inspiration from the Peruvian poet César Vallejo.

ESCUELAB LIMA

Viewing your arm through this box of tricks (top) transformed it into the furry equivalent shown above.

Magic could be defined as that which science has not yet made intelligible. But "even if science could explain everything, there would still be a place for magic," noted Kiko Mayorga, a Peruvian engineer and artist who co-founded the Escuelab centre that hosted the installations. This is because "magic is linked to surprise, and one's attention can never take in everything," he wrote.

Magic can comprise inventions that baffle us until we understand them. But this ignores a crucial fact: the best illusions rely not on advances in technology, but on permanent facts of psychology. "Magic, in the traditional sense, doesn't occur in the world, it occurs inside people," explains Oliver. "The magician merely helps people to trick themselves." ■

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