

as current issues such as the implantation of mechanical devices, the increased consumption of genetically engineered foods, a growing reliance on mobile phones and the Internet for daily communication, and endless modifications of the natural environment.

The authors invoke the influential concept of 'cyborgs': beings that are like humans in their ability to learn, feel and experience consciousness, but also like machines in having been 'programmed' to learn, feel and experience the world in only particular forms. Hence the authors' proper use of 'hybrids', a term they creatively apply to various contexts.

Hård and Jamison also provide useful summaries of the writings of earlier scholars, including Lewis Mumford, Siegfried Giedion, Lynn White and Raymond Williams, who all provided ground-breaking studies of science and technology in broad historical and cultural contexts, and Thomas Kuhn and Michel Foucault, who offered penetrating critiques of science and technology as being to varying degrees socially constructed. Hård and Jamison revisit, update and sometimes revise these earlier studies. By contrast, they criticize the founding editors of the leading journals of the history of science (George Sarton) and of the history of technology (Melvin Kranzberg) for promoting traditional uncritical views. Sarton's journal *Isis* may once have been guilty as charged, but Kranzberg's *Technology and Culture* was never so one-sided.

Far from being a critique of the excesses of only modern science and technology, *Hubris and Hybrids* is an extremely wide-ranging historical survey. Its coverage begins with the Scientific Revolution, Britain's Industrial Revolution, and the Enlightenment. More modern topics include technocracy movements, artistic uses of science and technology from William Morris to the film *The Matrix*, appropriate technology, the greening of corporate America and Europe, film and industrial design, and Asian developments. The richness of the authors' observations on these historical phenomena is exemplified by their comments on the medieval period: "eyeglasses and mirrors created opportunities to experience a technically mediated reality".

The authors hardly claim expertise in every area they discuss, but even so I was disappointed by their simplified comments on Mary Shelley's *Frankenstein*. Not only do Hård and Jamison follow most other commentators in wrongly describing Victor Frankenstein's unnamed and quickly abandoned creature as a "monster", but they also follow the crowd in wrongly characterizing Victor as a "mad scientist". Except in appearance, the "creature" — as he is usually called until the novel's later stages — is repeatedly portrayed as more human and humane than his creator. In my view, this should have been connected with the authors' own emphasis on humanity's changing identities. As for Victor, he is quite sane but is extraordinarily self-centred, as indifferent towards

his family and friends as he is to his creature. Ironically, his creature embodies Victor's missing moral compass.

Were Victor truly mad, he might well have escaped Shelley's actual target: his refusal to take responsibility for his research project. Here the authors missed the opportunity to use Frankenstein to bolster their own case. Neither work is a Luddite tract. Shelley argues that only if scientific experiments prove harmful to society should they be stopped. *Hubris and Hybrids* extends this same position

to inventors and engineers.

Recognizing that the relationship between the past and the future is different for historians from that for scientists, inventors and engineers, Hård and Jamison wisely offer no simple historical lessons, much less any silly predictions. What they provide instead are provocative and perceptive reflections that deserve to reach a wide general audience. ■

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An inside view of the Universe

Theaters of Time and Space: American Planetaria, 1930-1970

by Jordan D. Marché II
Rutgers University Press: 2005. 266 pp.
\$49.95

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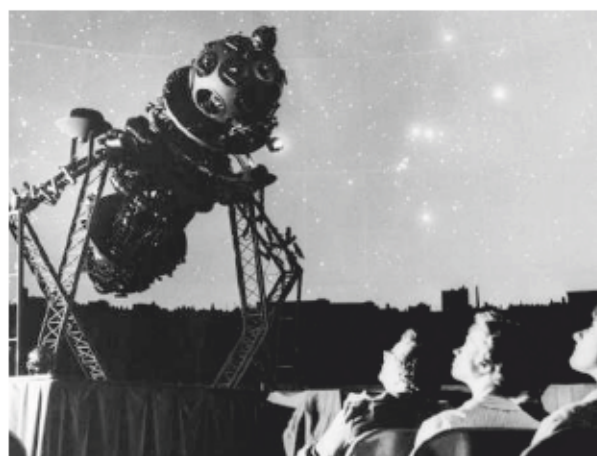
The spectacle of the night sky stretched overhead is the most breathtaking of natural wonders. Throughout time, people from every culture and from every part of the globe have experienced a sense of the infinite when confronted with the canopy of the Universe in a genuinely dark sky. However, the progression towards a more urbanized, industrialized society has brought with it a shroud of light pollution that has hidden this view from roughly half of Earth's population. But many city dwellers, especially in the United States, can still enjoy the splendour of a starry sky — by visiting their local planetarium, an island of sparkling celestial clarity (albeit artificial) in a sea of perpetual urban twilight.

In *Theaters of Time and Space*, author, science historian and planetarium veteran Jordan D. Marché II explores the evolution of planetaria from their inception in Germany to their proliferation across the United States. This account is both meticulous and colourful, and is sure to be enjoyed by anyone who is interested in astronomy, loves mechanical devices or has simply found inspiration under a planetarium's virtual starlight. The book outlines many of the social and cultural influences that fostered the spread of planetaria and their growth in popularity.

The concept of the planetarium was born from a confluence of ideas and technologies, including two early mechanical models of the Universe. The first of these, the orrery, uses a system of gears and wheels to demonstrate the motions of the Sun, Moon and planets. The second was a hollow rotating globe, large

enough to hold a small audience, with the stars and constellations painted on the interior to demonstrate celestial motions. With impetus from Oskar von Miller of the Deutsches Museum in Munich, an engineer named Walther Bauersfeld of the venerable Carl Zeiss optical company hit upon the idea of using projected images to show the motions of bodies in the Solar System against a fixed dome of painted stars. His colleague Werner Straubel then suggested optically projecting the stars as well. This engineering epiphany led to the genesis of the modern projection planetarium.

The Carl Zeiss company made the first planetarium for the Deutsches Museum on the roof of its own factory in Jena, Germany.



Star attraction: Zeiss projectors in the Adler Planetarium have given the Chicago public a glimpse of the heavens since 1930.

It opened in August 1923, and its abilities were demonstrated in the factory for a year before it was installed in the Munich museum the following August.

Marché chronicles the arrival of Zeiss planetaria in five major US cities between 1930 and 1939. Chicago's Adler Planetarium, featuring the Zeiss Model II projector, was the first, but others soon opened to enthusiastic audiences in Philadelphia, Los Angeles, New York and Pittsburgh.

Although Zeiss dominated early on, several imaginative inventors soon offered creative

alternatives to the complex and expensive Zeiss systems. An interesting aspect of this story is the reaction of the directors of Zeiss planetaria to the arrival of competing systems. The book details how these influential individuals were able to stifle the propagation of less expensive planetaria until after the Second World War. It was then that Armand Spitz created and marketed a projector system that was smaller, simpler and more affordable than the Zeiss system. Spitz's legacy was to make planetaria much more numerous and hence more accessible to the public. Although attacked by Zeiss purists, the Spitz system was aided by a lack of direct competition and the dawning

of the space age. Spitz went on to become the world's largest producer of planetaria.

But *Theaters of Time and Space* is about more than just machinery. Marché touches on the human issues behind the birth of this industry. The book describes the emergence of the planetarium professional, a discipline containing elements of scientist, technician, teacher and entertainer. The history of women in the field is also examined, revealing the early difficulties they had breaking into this male-dominated profession. The book follows the careers of pioneering female planetarium directors and illustrates the growth of opportunities for women that came with the success

of the Spitz system. Marché also describes how the spiritual nature of astronomy inspired early philanthropic sponsorship of planetaria.

The book is a well written, thorough and enjoyable tribute to planetaria. It demonstrates their importance in encouraging interest in space science, providing communication between astronomers and the public, and promoting scientific literacy. It would be interesting to know how many astronomers can trace the inspiration that sparked their career to a planetarium visit.

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Dying for a drink

Evolution goes backwards in the latest Guinness advertisement.

Martin Kemp

Three young men in a bar are enjoying pints of Guinness, the dark Irish stout. Without warning, time reverses as they go on a dramatic journey back through evolutionary history. They are metamorphosed at dizzying pace into Edwardian gents who successively become Saxon, bronze-age cavemen, and, with a brief freeze in the Ice Age, apemen and apes. Then they become flying squirrels, terrestrial and aquatic mammals, fish, flightless birds, diminutive dinosaurs, and the mudskipper-like amphibians shown here — not exactly the correct ancestral line but it makes the point. During this helter skelter, Sammy Davis Jr intones the song *Rhythm of Life* from the musical *Sweet Charity*.

Finally, the mudskippers drink from their stagnant pool and one of them emits a disgusted burp. "Good things come to those who wait," we are told, as three pints of the dark stuff loom up, the central one labelled 'Guinness'. This latest arty offering from Guinness will saturate TV screens and cinema advertising, in Britain at least, for months to come.

Readers of Richard Dawkins will be reminded of *The Ancestor's Tale* (Weidenfeld Nicolson, 2004), in which the evolutionary story is told in reverse. The advert is of course linear, whereas Dawkins had complex trees to head each of his chapters, but the dust-jacket of the hardback edition parades just such a sequence.

Guinness advertising has for a long time been self-consciously promoted as an art form. The famous toucan with a pint perched precariously on its beak first appeared in



1935, designed by John Gilroy with copy written by Dorothy L. Sayers, noted scholar and author of detective tales: "Just think what Toucan do!" The punchline of the current ad, "Good things come to those who wait", is a knowing revival of an earlier slogan used in several campaigns. The company's website, www.guinness.com, makes no bones about exploiting the reputation of its famous ads, which have included the relatively recent "Pure genius" series.

The present dash through 3 billion years in a minute, and through a reputed million pounds of Guinness's advertising budget, is the responsibility of the ad agency AMV BBDO. Framestore created the dynamic visuals, under the direction of Daniel Kleinman, whose credits include James Bond movie titles.

The seamless morphing of creatures and settings involves an astonishing variety of techniques, ranging from compounds of dough and breakfast cereals cooked up at home to the most sophisticated laboratory programmes for three-dimensional animations. Location filming included a trip

to Iceland. The levels of visual consistency and conviction are startlingly high, whatever the nature of the original source material. Space, colour, light and shade, texture and motion conspire to blend the real and the artificial inseparably. For instance, real mudskippers were filmed in the studio sipping their muddy water. They were subsequently endowed with back fins and reanimated in a way that is not apparent to anyone who is not closely acquainted with the creatures.

The tone is humorous and ironic, both visually and in the implication that our ancestors were glumly waiting over the long years for the advent of a good pint. But viewers with different frameworks of belief are reacting in very different ways. For those educated to accept darwinian evolution as a fact of life, the whole sequence is seen as a virtuoso and memorable *jeu d'esprit*, centring on a tongue-in-cheek message about the true goal of natural selection.

For those who not only reject the validity of evolution and object to it being taught as a proven theory, appreciation of the wit will be obscured by hostility. The narrative will be seen as bowing to the scientific conspiracy to take godless evolution as fact. It isn't difficult to see how it could be criticized by those who are fuelling the current climate of anti-darwinism.

For a product marketed internationally, anything that grates on local sensitivities must be a matter of concern. All this reminds us that our own biological assumptions may be someone else's *bêtes noires*.

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