Science, Entertainment and Television Documentary

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CHAPTER 1

Introduction: The Changing Landscape of Television Science

The 'Rotting Carcass of Science TV'?

At the beginning of 2015, Rich Ross, the new president of Discovery, one of the leading global producers of factual television of the last 30 years or so, responded to concerns about the direction the channel, and factual television more generally, has taken over the last few years (Walker 2015). The channel had recently come under criticism for a natural history programme entitled *Eaten Alive* (2014) which was promoted on the claim that its presenter, in a specially designed suit so he would survive, would allow himself to be swallowed by a giant snake. Although the programme didn't quite deliver on this claim, criticism was widespread, not just because of the specifics of this programme's apparent quest for sensationalism over animal welfare and biological science but because it was seen as representative of a particular attitude within contemporary factual channels (Palmer and Lawrence 2014). A persistent criticism in recent years has been that factual channels have moved ever further away from the serious presentation of science documentary, in favour of a shift towards *factual entertainment*, hybrid formats of programme that combine elements of documentary with elements from other genres, including game shows and soap operas, and programmes dominated by dramatised reenactments, visual effects and computer-generated imagery (CGI) (Brunsdon et al. 2001; Kilborn 2003; Beattie 2004; Campbell 2009; Beck et al. 2012). Despite Ross' assertions that such programmes may have run their course (Walker 2015), the predominance of these formats across a

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range of factual channels has generated criticism for some time. Scientist David Schiffman argued for instance:

> It's not just Discovery. If you turn on the History Channel, there's a good chance it'll be a show about aliens helping Hitler. The Learning Channel shows *Here Comes Honey Boo Boo*. It suggests there's nothing real that people care about enough to watch, and that's just not true. Look at the success of *Blue Planet* and *Planet Earth*; they're some of the most highly viewed nature documentaries in history and there's no people in them, just amazing animals doing cool things. It's not hard to get it right and also make it entertaining—the BBC does it all the time. (in Walker 2015)

Here Comes Honey Boo Boo (2012–2014) was a controversial docu-soap focused around the family of a toddler pageant show performer, shown on TLC (originally The Learning Channel), and cancelled after it emerged the girl's mother was involved with a convicted sex offender. Far from unusual in US factual channel output in the 2010s, criticism of such programmes often takes this approach of comparing them to the output of the global leader in public service factual programming, the BBC. This is despite similar concerns over the shift in British television from documentary to factual entertainment having emerged as well (Kilborn 2003; Byrne 2007), and concerns that pressures for audience-grabbing imagery have generated controversy over factual production practices even at the BBC (Singh 2011).

Another key criticism of the rise of factual entertainment has been the propensity for a shift not only in presenting scientific topics in ever more entertainment-oriented formats but in how factual producers have increasingly devoted resources and schedule space to pseudoscience and outright fiction. Referring in particular to the prevalence of programmes about ghosts on factual channels, for instance, Hale asserts:

> The viewer who is so inclined can spend the day in a certain band of the cable- television spectrum, switching from a paranormal show on A&E to a documentary about Hitler on the History Channel to a killer-asteroid report on Discovery to a talk show on Fox News, in a feedback loop that will reinforce any number of received notions about history, fate, conspiracy, the ruling caste and how the world is going to hell in a handbasket. (2009: 26)

Further controversies have emerged surrounding archaeology programmes based on, at best, questionable evidence (Evans 2012), and mock

documentaries not sufficiently signalled as such, notably the Animal Planet *Mermaids* (2012) programmes which one critic described as illustrating the 'rotting carcass of science TV' (Switek 2012). The nature of contemporary science documentary and factual entertainment television in this context of perceptions of dramatic decline and decay is the focus of this book. Before explaining the aims, approach taken and structure of the book, it is important to trace out some of the key stages in the development of science documentary on television and to identify, in particular, the emergence and characteristics of contemporary factual entertainment.

A Brief History of Science Documentary on Television

The historical development of science in film and television documentary has been rather neglected until relatively recently (Boon 2008; LaFollette 2013), rather surprising given the long history of the relationship between science and film. Science documentary does not, of course, *begin* with the origins of television; indeed in one historical account of the evolution of scientific films it is suggested that television science documentaries are in some senses a '*conclusion* of long historical processes' (Boon 2008: 2, original emphasis) as many of the structures, styles and tropes of science documentary were developed prior to the television era. An in-depth discussion of that historical development is not possible here, but it is important to mark out some of the key features that take science documentary from the early days of film through to the modern era of multi-platform factual entertainment.

The emergence of cinematography was heavily contextualised by notions of possible scientific applications, as evidenced by Eadweard Muybridge's experiments with photography that captured horses in motion amongst other things, and the same was true of early photography in relation to astronomy (see Chaps. 2 and 3). Soon after the Lumière brothers' first films were shown in 1895, a number of scientists, especially medical scientists, started using film as a tool for research and education (Boon 2008: 8). Some sciences featured regularly in early films, from newsreels capturing Howard Carter's excavation of Tutankhamun's tomb in the early 1920s to popular science-themed film series such as *Secrets of Nature* (1922–1933) which utilised techniques such as micro-cinematography and time-lapse footage to show the cells and movements of plants (Boon

2008: 29). In the 1920s and 1930s the term 'documentary' emerged, and again aspects of scientific disciplines were apparent, such as the ethnographic approach of Flaherty's seminal *Nanook of the North* (1922). The 1930s saw many early documentaries commissioned by corporations and government bodies, such as Paul Rotha's *Contact* (1933) for Imperial Airways and the films produced by John Grierson for the British Empire Marketing Board and then the General Post Office, all themed around the promotion of 'technological modernity' (Boon 2008: 36).

By the time television appeared then, the relationship between film and science was already really quite sophisticated, and many of the techniques that would later come to be typical of science documentary and factual entertainment actually have their roots in techniques developed in documentary and non-fiction films, for instance, the use of dramatised sequences and animation. Early television technology, both in terms of production (the predominant need for live content) and reception (the small, nine-inch screens) initially limited the capacity of science documentarians to innovate in terms of visual styles and forms. One consequence of technological limitation in British science television, for instance, was for a tendency to use close-ups on in-studio presenters, which further led to embedding the stylistic trope of the science presenter as television personality into the television science format. As Boon notes 'in the longer term […] it was the personality issue—linked to factors of immediacy and 'intimacy'—that became significant in non-fiction broadcasting' (2008: 193). For example, the success of the popular early 1950s' programme *Animal, Vegetable, Mineral?* (1952–1959), essentially a game show where a panel of experts were presented with a previously unseen object and made informed guesses as to its nature, made stars of participants Glyn Daniel and Mortimer Wheeler. It's worth noting how the rise of the personality in television science wasn't particularly related to the type of broadcasting system in place, as it occurred in both the public service context of the BBC in Britain and the fully commercial system of the USA, where television in the 1940s and 1950s was seen by many scientific organisations as means for publicity (and perhaps funding as a result) (LaFollette 2013: 12). In the USA, scientists who braved early television also achieved celebrity status, for instance, figures such as astronomer Roy K. Marshall who hosted *The Nature of Things* (1948–1953) on NBC (LaFollette 2013: 11). The importance of personality wasn't intrinsically linked to scientists, however. PR officer for the Johns Hopkins University, Lynn Poole, for instance, became 'an instant star' when appearing on the

Johns Hopkins Science Review (1948–1995) (LaFollette 2013: 12). In Britain, Patrick Moore, although only an amateur astronomer, became a television celebrity through hosting the BBC magazine programme *The Sky at Night*, beginning in 1957 and continuing until his death in 2012 (setting a record for presenting a continuing series in the process). David Attenborough, on the other hand, though a Cambridge graduate of natural sciences, began his career at the BBC in 1952 having barely watched any television or given the nature of television much thought (Attenborough 2002: 11). Initially a producer, of *Animal, Vegetable, Mineral?* amongst other things, he finally appeared in front of the camera in the series *Zoo Quest* in 1954 (which ran until 1963).

Whilst studio-based material was relatively primitive in some senses, filmed material for science programmes was also produced in the 1950s; moreover, as in the case of *Zoo Quest*, getting resources to make films for broadcast in Britain wasn't easy (Attenborough 2002: 34). Although experienced documentary filmmakers did work with the BBC—Paul Rotha, for instance, was briefly Head of Documentaries between 1953 and 1955 (Boon 2008: 203)—it took time for filmed material to feature more frequently as part of BBC output. Documentary film was still a viable and prominent outlet in the 1950s, as shown by the award-winning successes of the film of Thor Heyerdahl's *Kon-Tiki* (1950) expedition and *The Silent World* (1956), which made Jacques Cousteau a star. Cousteau also worked on television series in the 1950s, but didn't shift fully to television until *The Undersea World of Jacques Cousteau* premiered in 1968 (LaFollette 2013: 90). Filmed science documentaries, aside from the appeal of location footage, often involved the use of more sophisticated techniques than were available on the 'show and tell' formats of studio-based television programmes like *Animal, Vegetable, Mineral?* (see Boon 2008 for a discussion). In the USA, where productions were financed in ways allowing significant resources to be used for television films, famous Hollywood figures became involved in the production of television science programmes. Walt Disney, for instance, established the *Disneyland* 'science factual' (LaFollette 2002: 54) anthology series beginning in 1954 (running till 1990), combining live-action sequences with animation in programmes about a variety of science topics, including space exploration. Celebrated director Frank Capra was involved in the production of four science films in the *Bell Television Series* (1956–1962) that also had high production values and complex combinations of techniques, including dramatised sequences, animation and poetically composed scripts around the expositional material

offered by scientists and presenters. Both the Disney and Bell programmes were filmed in colour as well, and the commercial American broadcasting environment notwithstanding, some of these films were made to be screened in schools and treated as educational and informational tools, not just as entertainment (LaFollette 2013: 51). A combination of techniques thus developed in films and the experimentation of early television science programme-makers laid the foundations for contemporary science television. LaFollette argues that, in the US case at least:

> Production approaches that are now standard practice on *NOVA* and the Discovery Channel derive, in fact, from experimentation by television pioneers like Lynn Poole and… such programs as… the Bell Telephone System's science specials. These early efforts were also influenced by television's love of the dramatic, refined during its first decade and continuing to shape news and public affairs programming, as well as fiction and fantasy, today. (2002: 35)

In Britain, science programming, particularly at the BBC, proved pivotal in the organisation's attempt to position and establish itself, both in the context of successful commercial television from the mid-1950s onwards and in terms of seeking a global televisual status, as evidenced by discussions about the role of the BBC in the development of satellite technologies (see Farry and Kirby 2012). For a range of reasons, British broadcasting started to come into its own relative to the USA in the 1960s. In the USA at that time, science documentaries tended to come more in the form of specials, such as those produced by the National Geographic Society, which embraced television in notable programmes like *Miss Jane Goodall and the Wild Chimpanzees* in 1965 (LaFollette 2013: 89). Whilst there had been early enthusiasm for television amongst some science institutions in the 1940s and 1950s, by the 1960s some institutions like the Smithsonian (LaFollette 2013: 90) and the American Association for the Advancement of Science (ibid.: 94) were becoming remarkably reluctant to engage with television, and commercial pressures for entertainment programming began to squeeze science content to some extent. In Britain, on the other hand, the emergence of the 'comfortable duopoly' (Williams 2010: 159) between the public service BBC and the commercial network ITV led to a period of regular complementary scheduling of programming such that the BBC and ITV didn't try to compete for audiences, giving factual programme-makers the potential to experiment with formats in the

relative safety of a small number of channels (two BBC channels from the mid-1960s and one ITV channel, which remained the case up until the launch of Channel 4 in 1982) and the potential for big audiences. It was in this period that a number of long-running science shows were established such as the magazine programme *Tomorrow's World* (1965–2003) and the science documentary strand *Horizon* (1964–) which inspired and has provided content for the American PBS series *NOVA* (1974–). Establishment of the BBC Natural History Unit in 1957 had signalled an institutional commitment to science at the BBC (Boon 2008: 234), and ITV also committed itself to producing science-based television series such as the long-running natural history series *Survival* (1961–2001). This period also saw the production of what are sometimes regarded as the high watermarks of television documentary, in a number of high production value, multi-episode special series focused on grand concepts, such as Kenneth Clark's *Civilisation* (1969), Jacob Bronowski's *The Ascent of Man* (1973), a co-production between the BBC and Time-Life (LaFollette 2013: 122), and Attenborough's *Life on Earth* (1979). Attenborough's series was screened in dozens of countries and ultimately reached hundreds of millions of viewers, as did another transatlantic co-production (between the BBC and PBS affiliate KCET) in 1980, Carl Sagan's *Cosmos: A Personal Voyage*. These works continue to represent the quality standard according to which many science programme-makers today operate and are judged, particularly *Cosmos* (as will be shown in Chap. 3). As an aside, it is striking given the cultural resonance of *Cosmos*, and its resurrection in 2014 (see below), that apart from a brief descriptive mention by Barnouw (1993: 316–317) the series has been virtually ignored by the major scholars of documentary. For instance, it is not mentioned by Nichols (1991, 2010), Renov (1993), Corner (1996) or Winston (2008). One reason for this may be the growing perception over time that these kinds of documentaries, despite their high production values, exotic locations and extended runs over multiple episodes, are otherwise 'highly conventional' in offering the exposition of an authoritative presenter in a manner seen by some as though audiences are 'being patronised' (Kilborn 2003: 9). As the aesthetics of documentary diversified in a number of different ways through the 1960s and 1970s, attracting the critical scrutiny of documentary scholars, science documentaries seemed to stick to a rather staid model of comparatively dry exposition of scientific knowledge. Although often still cited as markers of quality television (for instance, Wheatley 2004), science documentaries have definitely not received the level of critical attention from scholars as

have other kinds of documentaries. A trace of this sentiment is even evident from the time, albeit across the Atlantic. Attenborough recounts, for instance, how initial offers for broadcasting *Life on Earth* in the USA proposed cutting his presentation entirely, with a narration recorded instead by a Hollywood actor like Robert Redford, though this option was personally rejected by Attenborough (Attenborough 2002: 293). The idea of science documentaries as conservative, aloof, patriarchal and lacking in both wide popular appeal (though *Life on Earth* was a success in the USA too) and aesthetic interest has continued to persist, not least because of changes in the broadcasting environment since the early 1980s.

The transformation of television since the 1980s has created something of a paradox for science documentary. On the one hand, the gradual development of multi-channel television, through cable, satellite and then digital, has seen a massive proliferation of potential space for science programming compared to the days of two or three analogue channels. Establishment of dedicated niche factual channels, such as the Discovery Channel (1985), the History Channel (1995), Animal Planet (1996) and the National Geographic Channel (in the UK in 1997 and in the USA in 2001) amongst others, has presented new platforms for science programming, providing spaces for new programmes and also giving archive programmes an extended broadcast life through re-runs and syndication. Factual programming can, depending on the subject matter and format, be relatively cost-efficient to sell to international markets as well, widening the potential reach for factual programme-makers still further (Steemers 2004). On the other hand, the fragmentation of television audiences across multiple channels, with the potential for audiences to skip factual programmes altogether as they have gradually shifted from the major networks to niche channels, has had significant consequences for the circumstances of the production of factual television, with a particular shift towards an 'entertainment orientation' (Kilborn 2003: 9). It is at this time, particularly in the 1990s, when factual entertainment as a label for programmes distinct from conventional documentary begins to be used routinely in both academic and industry discourses (Brunsdon et al. 2001; Kilborn 2003; Beattie 2004; Beck et al. 2012). The rise of factual entertainment has several dimensions significant for modern science documentary, relating to economic, technological and aesthetic concerns.

Since the 1980s at least, international co-productions have increasingly become the norm, with even otherwise well-funded public broadcasters like the BBC routinely working with commercial companies to produce

their core factual content. The BBC began working with Discovery in the mid 1990s (Chris 2002: 19), for instance, in a series of deals that lasted until 2013 (Stelter 2013). These new players have brought their own approaches to producing factual television (Chris 2002) impacting on both subjects and styles of programme-making in public service productions (Palfreman 2002). That trend looks set to continue with the announcement in 2015 of a deal between the production team behind some of Attenborough's series and the online streaming television service Netflix, as television enters the multi-platform phase (Sherwin 2015). The practice of re-editing and re-voicing programmes, as was suggested for *Life on Earth*, for example, has become a routine process for many factual programmes being re-cut to suit different national markets and also for different types of broadcasters. Although this may seem a relatively innocuous and cost-effective behind-the-scenes production practice, it highlights how the imperatives of reaching global audiences can have subtle yet ultimately significant impacts on programme formats and subjects. An emphasis on the kinds of programmes that travel well internationally, that don't offer too much of either a parochial or political approach to topics, is notable, with again an emphasis on entertainment more to the fore. Programmes on subjects like outer space, dinosaurs, ancient civilisations, wildlife and extreme weather, for instance, can be more readily repackaged for audiences across international markets than programmes concerning more specific socio-cultural and politico-economic topics (such as, say, the pharmaceutical industry). Indeed, this book will show how, in many scientific areas, political issues relating to the sciences being depicted are often marginalised or omitted altogether in contemporary factual entertainment and science documentary.

As well as changing economic imperatives, new technologies, particularly improvements in portable recording equipment (Kilborn 2003: 19), have opened up entirely new formats of programme, such as *Cops* (1989–) which uses camera crews riding along with US police and filming their investigations. As cameras have increasingly become part of emergency services' standard equipment, programmes created from footage collected by car dashboard cameras, police helicopters and surveillance cameras have also appeared, for example, series like *World's Wildest Police Videos* (1998–2001). Camcorders and most recently video-enabled mobile phones have provided another source of content for factual television producers, particularly amateur footage of extreme weather and disaster events (discussed further in Chap. 6). Technology also links to the idea that the era

of factual entertainment television is dominated by 'the notion of performance' (Kilborn 2003: 13). For instance, camera-rig systems with small remotely controlled cameras replacing intrusive camera crews have enabled advances in the so-called 'fly on the wall' documentary-style programmes that first appeared in the 1970s. As well as award-winning series such as *Educating Essex* (2011) which used a camera-rig system to film inside a British secondary school, these systems have been used for far more contrived entertainment formats, such as the iconic programmes associated with reality TV *Big Brother* (seen first in the Netherlands, 1999–) and *Survivor* (seen first in Sweden, 1997–) (for an overview of reality TV see Beck et al. 2012). Concerns of overt game show formats from reality TV impacting on documentary programmes have been seen in relation to programmes like the archaeology series *Time Team* (1994–2013) which borrowed the "beat the clock" format of many reality TV makeover shows (see Brunsdon et al. 2001 for a discussion of makeover shows). Another successful attempt to combine science with reality TV was *Rough Science* (2000–2005) which utilised a *Survivor*-style format of placing a group of scientists in a remote location and setting them a number of scientific challenges. Such programmes have arguably been the exception not the rule, however, and the tensions between documentary and reality TV, such as between performance and reality and documentary and entertainment formats, have been raised by other programmes. *The Crocodile Hunter* (1997–2004), for instance, took a very different approach to the patriarchal approach of Attenborough programmes. Hosted by a wildlife expert and zoo owner, Steve Irwin, the programme was far more focused on Irwin as a performer with his particular style involving getting into close proximity with wildlife, especially dangerous animals, which not only led to much criticism but ultimately to his death in 2006 as a result of being stung in the chest by a sting-ray whilst filming. Despite criticism from various professional quarters, Irwin's programmes were globally popular, even leading to him starring in a fiction film *The Crocodile Hunter: Collision Course* (2002), and his style of up-close natural history documentary has persisted with other presenters and factual entertainment programmes (like *Eaten Alive*).

These tensions, however, are perhaps best exemplified by the rise of the 'docu-soap' which is 'essentially a hybridized format, combining certain structural and narrative features of soap-opera with elements of the observation documentary' (Kilborn 2003: 57). A craze for docu-soaps was apparent on mainstream channels in the mid- to late 1990s (Kilborn 2003: 58), covering a variety of ordinary activities, from learning to drive

to working in airports, and regarded with quite a high level of disdain from many, such as the playwright Anthony Neilson who suggested they represented the 'nadir of human achievement' (in Winston 2008: 268). Whilst their prevalence on major channels may have died down somewhat, in the context of specialist factual television channels the docu-soap has become arguably the primary format. Adoption of docu-soap styles in science programmes was quite quick, with shows like *Big Cat Diary* (1996) following big cats on the Masi Mara (Richards 2014) and other programmes focused on historical reenactments (see Chap. 5). More recently, factual channels have shifted ever more to a predominance of docu-soaps, arguably also further away from conventional scientific topics and towards more dramatic, entertainment-focused subjects. Shows such as *The Deadliest Catch* (2005–) about fishing vessels, *Ice Road Truckers* (2007–) about truck drivers in Canada and Alaska, *Ax Men* (2008–) about loggers, *Doomsday Preppers* (2012–) about survivalists preparing for impending doomsday and many others (including those mentioned at the beginning of the chapter) show this shift towards factual entertainment formats has not abated.

Whilst some of these features can be traced quite a long way back into television and film history, such an emphasis on entertainment, performance and generic hybridity, a final feature of the shift to factual entertainment of central relevance to the concerns of this book, and arguably much more clearly a symbol of the modern age of screen media, is the rise of CGI in factual television programmes. Although CGI had been used in television programmes on occasion before (including in the compositing of images in Sagan's *Cosmos* for instance), when the BBC produced *Walking with Dinosaurs* in 1999 it represented a key moment in factual television, in much the same way that its inspiration *Jurassic Park* did for the use of CGI in fiction film in 1993. Although *Walking with Dinosaurs* used actual location shooting, animatronics and puppet work as well, its foregrounding of fully photorealistic CGI dinosaurs, within a format of natural history programmes reminiscent of the likes of *Life on Earth*, represented a significant shift in the nature of factual television programmes. A huge gamble for the BBC, the series was the most expensive factual programme ever made but it paid off, achieving the biggest audiences for a first-run factual programme, and went on to win multiple awards, essentially generating an entirely new way of making programmes about palaeontology (see Scott and White 2003; Campbell 2009; Chap. 4). CGI has increasingly begun to feature in a variety of factual television programmes, for instance, in historical programmes such as *Virtual History: The Plot to Kill*

Hitler (2004) which mixed archive footage with dramatised sequences augmented by CGI to try and create a seamless narrative showing events featuring Hitler, Churchill and other figures as if they had been captured on film but which instead were entirely constructed. Again, the use of CGI has generated anxieties and concerns amongst documentary scholars about the impact on television documentary and a shift away from factuality and documentary sobriety towards spectacular entertainment, and a discussion of these concerns is a key theme of this book.

In 2014, a remake of Sagan's *Cosmos* was produced, and a brief comparison of the two series' distribution gives a snapshot of just how the landscape of broadcasting has changed in that 30-year period and how these concerns about the nature of modern-day factual entertainment science programmes are perhaps more complicated and deserving of closer critical scrutiny than the often highly pejorative and dismissive approach taken by many commentators. The new series, partly funded and produced by Seth Macfarlane, creator of comedy animation series *Family Guy* (1999–), was presented by astrophysicist Neil DeGrasse Tyson and subtitled *A Spacetime Odyssey*. Three features of the changes in the science documentary environment between Sagan's 1980 *Cosmos* and Tyson's 2014 *Cosmos* highlight the importance of looking at this distinctive area of science communication, documentary and science in popular culture in more detail. Sagan's series had a total production budget in the region of $8 million, a significant amount for the time, and when first broadcast in the US it became the highest ever rated show of any kind in PBS history, a record which lasted for a decade (Kiger 2014). Globally the series was screened in over 60 countries to an estimated audience of some 500 million viewers (Kiger 2014). It was also a co-production and reflecting what has become commonplace, was edited and formatted differently for the American and British markets and screened at significantly different times. At that time, programmes produced in the USA were often screened in the UK many months later (and vice versa). *Cosmos*' global audience developed over some years as the programme spread to different countries around the globe. Successful television series were treated much like cinema releases, heavily trailed and selectively scheduled as forms of 'event' television to try and maximise ratings (important to both commercial and public service broadcasters—for demonstrating value to advertisers for the former and justification of costs to state paymasters for the latter). That exclusivity of broadcasting, partly possible because of the small number of channels ensuring proportionately large audience shares, arguably contributed to

the cultural prominence of the presenters of factual series produced at this time (like Attenborough, for instance). Sagan, in particular, has been cited as a formative influence on subsequent scientists' careers in science. Tyson's series includes, in the opening episode, an account of Tyson meeting Sagan as a teenager, before *Cosmos* aired but at a time when Sagan was already a prominent public figure in the world of mediated science. *Cosmos* and Sagan are also directly cited in the highly successful BBC space science series *Wonders of the Universe* (2011) by its presenter, physicist Brian Cox, as an inspiration in his choice of science as a career. Part of that kind of impact, as much as it has to do with the eloquence and quality of Sagan's performance, rests on the specifics of the production environment at that time that gave such programmes the potential to become memorable cultural and televisual events. This is all the more remarkable from a current perspective given that, the accompanying book aside, the transmitted episodes were pretty much all the audience had to go on. This was a time when video recording was in its infancy and media companies were viewing it as a threat to cinema and television audiences rather than, as it turned out to be, another valuable stream of revenue.

Tyson's *Cosmos*, on the other hand, has been produced in the vastly changed landscape of international, multi-channel, multi-platform television of the 2010s. One particularly illustrative difference lies in how the new series was broadcast. Superficially, it retained some of the principles of public service television. It premiered in primetime on Sunday nights on Fox (the fourth "major" broadcaster, founded in 1986 and by the mid-2000s often the most-watched American television network) but industry commentators pointed to what was now a risk of showing a science programme on a major network channel in primetime, science programmes long since having largely moved to the factual channels (Jenkins 2014; Kissel 2014). Instead of the precious exclusivity of programme content seen in the 1980s, programmes today are broadcast in a radically different manner. The 'event' television approach of the early 1980s can still be used, but its returns are significantly lower in terms of audience figures. The new *Cosmos* producers used a 'uniformed scheduling' approach in the US market, where the show was simultaneously broadcast on Fox and *nine* other channels (National Geographic Channel, FX, FXX, FXM, Fox Sports 1, Fox Sports 2, Nat Geo Wild, Nat Geo Mundo and Fox Life). This strategy led to a claimed 45 million Americans watching at least some of the series (Kissel 2014), with average audiences of around 3 million per episode (Jenkins 2014). Maximising audience reach for the series then was based

not an exclusive event television programme but a widely available, cross-channel offering. Internationally, the strategy was different, with National Geographic International screening the series close behind the US broadcasts, bringing the series to 125 countries, 135 million viewers and claiming triple-digit increases in primetime/total day average audience numbers in countries such as Argentina, Australia, Colombia, Croatia, Italy, Korea, the Netherlands, Norway, Portugal, Spain and the UK (Kissel 2014). For specialist international channels, having exclusive contents and brands remains a key part of maintaining audience share, though that share is necessarily treated in a very different manner—focused on niche competition rather than the mass audience competition of the days of analogue television.

Aesthetically speaking, Sagan's *Cosmos* built on the wide range of innovative representational strategies developed over the history of film and television science documentary, including being one of the first television documentary series to use CGI in some of its sequences, as mentioned earlier. The combination of live location footage, live studio footage and, now famous, composited sequences of Sagan walking across a cosmological calendar, depicting the life of the cosmos as if concentrated into a single year with all of recorded human history taking place in the last seconds of December 31 (see Fig. 1.1) made the series visually distinctive. It also used an array of dramatised sequences, time-lapse and slow-motion camera-work, microphotography from inside human cells, hand-drawn animation, rostrum camera-work and a host of other visual effects, all reflecting the substantial complexity possible in factual television content by that time (and more evidence of the surprising marginalisation of the series by all but a handful of documentary scholars (such as Metz 2006)). Tyson's series reproduced many of the visual tropes of Sagan's, including the calendar and the idea of a "ship of the imagination" in which the host travels through space and time exploring a variety of scientific concepts, discoveries and phenomena. Tyson's programme also neatly links together the trends of 21st century factual entertainment programmes, using CGI extensively throughout in a variety of forms, with some of the techniques of science programmes of the 1950s. Sagan's series had used dramatic reenactments of historical discoveries, although only his voice is heard narrating the events being depicted by actors, whereas Tyson's series reconstructs historical sequences in a drawn animation style, very similar in appearance to that used in *Disneyland* films about space in the 1950s, and featuring a range of actors presenting the events being recounted. Amidst the 'rotting carcasses' of other science programmes, Tyson's series