MONDAY 17 SEPTEMBER, 09.00-10.30

S24  THE PLACE OF EUROPE IN THE HISTORY OF GENOMICS

Location: SciM - Dana Study  Chair: Bud, Robert
Organiser(s): Lowe, James

In this symposium, we will show that European transnational collaboration played a crucial role in the history of genomic science. We will question the unitary narrative that both scientists and commentators still convey, which equates genomics with human genomics, and in particular the Human Genome Project. In this narrative, the history of the Human Genome Project has often reflected the role of the so-called G5, five large-scale sequencing centres that contributed a significant share of the draft human genome sequence announced in 2000 and published in 2001. Of the G5 sequencing centres, four are based in the USA, and one in the UK. As a result of this, the European contribution to the emergence and development of genomics has remained obscure. We will focus on the key contributions of the European Commission in fostering international collaboration during the early history of yeast, human and pig genomics: 1. The yeast genome sequencing project (1989-1996), directed by the Commission’s Directorate-General XII (DGXII) for Science, Research, and Development, involved more than 80 institutions across Europe. Drawing this massive European effort together with yeast genome sequencing projects in North America and Japan generated a single reference sequence able to unite a global yeast genomics community. 2. The Human Genome Analysis Programme (1990-1992) was also supported by DGXII and originally immersed into a broader initiative on predictive medicine within the BIOMED-1 programme. A specific genomics programme enabled human and medical geneticists to pool their results, mainly through the funding of chromosome mapping workshops in Europe. 3. For the pig, the genome mapping initiatives were organised and funded by the Commission’s BRIDGE and BIOTECH programmes (PiGMaP, 1991-1996). There were a number of successor projects to further improve the genomic resources available to researchers, and the Commission eventually funded parts of the project to fully sequence the pig genome (2003-2009). As well as tracing the history of genomics in Europe, we will present a number of quantitative techniques that considerably help towards this goal. One of us has been developing methods in bibliometrics and Social Network Analysis (SNA) that enable us to visualise how European institutions collaborated between them and with other continents in the sequencing of the yeast, human and pig genomes. The aim of the symposium will be to situate the different genomic initiatives within the strategies of the European Commission. These strategies involved building collaboration between hundreds of European institutions that would pool their mapping and sequencing results and, eventually, complete the genome of those organisms. The European strategy stood in stark contrast with that of the G5, that involved the sequencing of the human genome by a selected club of factory-style laboratories. Our symposium will, thus, question the unity of the history of genomics by retrieving the horizontal, cooperative and largely forgotten strategies that proliferated in Europe during the early-to-mid 1990s. We will also reflect on how these strategies may be useful in current attempts at improving the medical translation of genomic data.

Wong, Mark (University of Glasgow) and Leng, Rhodri
[Bibliometrics, Social Network Analysis, and the Human Genome Project]

The significance of the Human Genome Project has led to a widespread view of genomics as a science practiced by a small number of factory-style sequencing centres. However, not all
genomic initiatives reflect this pattern and the strategies of sequencing were subjected to significant transformation over time. In this paper, I will show how bibliometrics and Social Network Analysis offer a broader and more nuanced image of genomics, especially in considering the early collaborative efforts in European countries. I illustrate the findings of a large-scale quantitative study that analyses collaborations among international institutions in the sequencing of the human, pig and yeast genomes (c.1980-2015). I also outline an innovative method of mapping institutional networks by linking data from the European Nucleotide Archive, Europe PubMed Central and SCOPUS. This method helps to identify the different organisational strategies within and across each sequencing initiative, their evolution, and how the quantity, nature and association of the European institutions had changed. The changing roles and centrality of European institutions in the global genomics network will be discussed. I will argue that the European actors are characterised by decentralised efforts and involved diverse laboratories from various disciplines. Through this approach, one can identify several less-prominent and under-researched institutions that were involved in human, pig, and yeast genomics in Europe. I analyse their network positions and influence before and after the rise of the large-scale sequencing centres known as the ‘G5’, and suggest how and why they were involved in genomic sequencing.

Garcia-Sancho, Miguel (University of Edinburgh), and Albayrak, Gulsah
The Human Genome Analysis Programme: Europe’s attempt to govern genomics from below

My paper will explore the involvement of the European Commission in the early history of human genomics. I will focus on the Human Genome Analysis Programme (HGAP), launched in 1990 with the aim of topping-up national funding and fostering coordination between European States in the mapping and sequencing of human genes. The HGAP promoted a horizontal approach to human genomics that stood in marked contrast with other continents – namely the US – seeking to create new, factory-style genome mapping and sequencing centres. Instead, the European Commission opted for creating networks and pooling the results of existing European laboratories. Toward the mid-1990s, five powerful institutions from the US and Britain – the so-called genomic G5 – proposed a concerted effort in which the human genome would be systematically completed by a selective club of large-scale centres. Their strategy clashed with the more collectivist and gradualist approach of the European Commission, and was backed by the Wellcome Trust and US National Institutes of Health. The G5 finally implemented its vision, which has been retrospectively identified with an international, unified and successful Human Genome Project. By exploring forgotten approaches such as the one pursued by the European Commission, scholars may question the unity of the history of genomics. The very expression “Human Genome Project” evokes a coherent effort that never existed as a single administrative entity. Instead, the 1990s witnessed a proliferation of national and transnational human genome initiatives, some of which were chosen and others discarded due to highly contingent reasons.

Szymanski, Erika (University of Edinburgh) (in absentia)
[Yeast Genome Mapping in the European Community]

Saccharomyces cerevisiae, baker’s yeast and a common experimental organism, was the first eukaryote to have a complete sequenced genome with a first full draft released in 1996. Despite the historic centre of yeast genome mapping activity being in the USA, the centre of yeast genome sequencing activity became the European Community (EC) through the initiative of André Goffeau, a Belgian biologist civil servant. Between 1989 and 1996, over 80 European public and private laboratories had contributed sequence data, together with twelve institutions from North America and Japan. The resulting single “reference sequence,” was praised for its high quality and became – and remains – a powerful resource for a global yeast genomics community. I argue that the ability of the yeast genome sequencing project to unite diverse European laboratories in a landmark scientific effort was enabled by the peculiar
material affordances of yeast: the prior development of a single reference laboratory yeast strain, the culture of freely sharing materials, and the ease of sharing a single-celled organism. The development of a yeast genomics community and reference strain are inextricably co-dependent. Yeast community resources enabled EC cooperation, shaping the nature of the genome sequence generated by that community, its perceived ownership, and its perceived utility. The ethos of sharing engendered within the yeast community and the ethos of cooperation being developed with the EC colluded to produce unity out of diversity in the form of a single shared resource that could not be claimed by just a few genomics powerhouses.

**Lowe, James (University of Edinburgh)**

[The Pig Genome Mapping Project, 1991-1996]

The European Commission-funded Pig Genome Mapping Project (PiGMaP; 1991-1996) was the first systematic effort to map the genome of the pig. The consortium was based on collaborations in the mid-1980s to investigate the genetics of a condition called malignant hyperthermia, as well as research concerning the Swine Leucocyte Antigen region associated with immune response. PiGMaP was an example of two main developments in European Commission scientific research policy: the formation of European-scale collaborative biological projects to produce fundamental resources for the development of a field of research, which would not be feasible for individual laboratories to produce; 2. The European Laboratory Without Walls, in which additional collaborators could share data and materials, in turn having access to the databases and findings of other participants. Through this, more peripheral groups in Europe and those outside Europe were able to participate. PiGMaP played two key roles in the development of an international community of pig genetics researchers. It provided a platform for the cooperation of actors across Europe and then the world to work towards the common objective of producing maps of genetic markers. Further collaborations developed from this work, and were enabled by the production of maps, the development of statistical and molecular methods and advancements in informatics that were the outcomes of PiGMaP and allied research. It also ensured that some institutions involved, who at this time were experiencing a decline in the amount and security of their research income, were able to continue their research into livestock genetics.
MONDAY 17 SEPTEMBER, 09.00-10.30

I142  MEASUREMENT, ESPECIALLY TIME

Location: SciM - Dana Study  Chair: Keene, Melanie

Holmberg, Gustav (University of Gothenburg, Sweden)
The production and distribution of synchronized time in Sweden, 1860-1930

This paper studies the production and distribution of time in Sweden. Following the unification of a diversity of local times into a single national time ("Svensk normaltid") in 1879, as well as because of the needs of navigation and expanding railway and telegraph systems, methods for making and disseminating time increasingly became an issue that involved technological and astronomical expertise. It entailed collaboration between private, commercial, and state interests. The spread of unified and synchronized time had both practical and cultural values. Produced at central standard-bearing institutions such as astronomical observatories and state-run navigational schools, it was distributed through a network of telegraph wires, publicly visible clocks in urban settings and railway stations, and time balls close to harbours.

Pan, Yue (Shanghai Jiao Tong University)
How Did Chinese Scholars Discover the Hijrah Epoch of Islamic Calendar?

The Chinese-Islamic calendar, namely Huihui Lifa, had made a misunderstanding on the Islamic epoch at first. Instead of the correct epoch A.D.622, it took A.D.599 as its epoch. This misunderstanding was caused by the confusion on the lunar and solar calendar. Newly found materials prove that this misunderstanding occurred not long after the translation of Huihui Lifa at the early period of Ming Dynasty. The calendar Weidu Taiyang Tongjing, which was compiled by Yuan Tong, shows the influence of the misunderstanding on the calculation of Chinese astronomers. During the late period of Ming Dynasty, Chinese scholars had also been aware of the problem on the epoch, and they used an algorithm called jiaci fa to make some kind of correction. In Qing Dynasty, the problem on the epoch of Huihui Lifa was reinterpreted by Chinese scholars including Mei Wending and Li Rui, who said there were two different epochs for Islamic calendar. This study shows that how Chinese scholars discovered the epoch of Huihui Lifa from the misunderstanding.

Wu, Yan (Institute for History of Science and Technology, Inner Mongolia Normal University)
Shift of Traditional Festival during Calendric Reform in early half of 20th century: Focusing on Confucius’s Birthday

During Republic of China in early 20th century, the rite of Confucius's birthday gradually replaced the biannual sacrifices to Confucius, and was eventually established as an official commemorative day. At the time, the determination of the definite date of Confucius’s birthday both in the Chinese lunisolar calendar and in the Gregorian calendar, as an academic question, was still unsolved. The questions which needed to deal with included how to determine the correct ancient records, how to reckon the date of Confucius's birthday in the Chinese lunisolar calendar and how to transform this date from the Chinese lunisolar calendar to the Gregorian calendar. In terms of these questions, there were several approaches at the time. All of them illustrated some different concept of periodic commemorative day. As a typical case, shift of the date of Confucius's birthday and modification of commemorative ritual related to Confucius illustrated how the government reconstructed social order through reconstructing the order of time.
MONDAY 17 SEPTEMBER, 11.00-13.00

S04/2 INTERPRETING ANCIENT EGYPT: THE ONE AND THE MANY

Location: SciM - Dana Studio  
Chair: Gertzen, Thomas

Organiser(s): Navratilova, Hana; Bednarski, Andrew; Dodson, Aidan; and Lewis, Clare

The study of ancient Egypt embraces a wide range of academic disciplines, from archaeology and historical scholarship, through a multiplicity of 'scientific' approaches, from anthropology to zoology, straddling the humanities and sciences divide. As with other humanities and scientific disciplines, modern social and political attitudes and opinions have impacted on Egyptology, affecting how ancient Egypt has been interpreted over time. In recognition of the resulting fluctuations in the theoretical principles underlying the practice of the discipline, there has been a growing trend in international Egyptology to reflect more rigorously on its own history, which has exposed both continuities as well as discontinuities of practice. The historiography of Egyptology is thus a multifaceted endeavour, embracing research paradigms concerned with an ancient civilization, and their subsequent application of knowledge in modern contexts. Egyptology has addressed its own conceptualization and practices since at least the beginning of the twentieth century, including reflection – or the lack thereof – on sociological and political perspectives. Studies have both diversified and intensified over the past two decades, with a more conscious appreciation of Egyptology as fundamentally interdisciplinary endeavour, with established geographical, chronological, and cultural boundaries. The time-boundaries embrace the period from pre-history to the Islamic conquest, the geographical ones the Nile-valley and surrounding areas. Cultural boundaries are set wide, encapsulating all those which have impinged on this chronological-geographical area, but in particular on users of the ancient Egyptian language, both in its hieroglyphic form, and in its final Coptic incarnation. Egyptological historiography benefits from histories of other disciplines; vice versa, it complements other disciplinary historiographies, as well as broader intellectual and cultural history. For example, colonial and postcolonial studies have highlighted aspects of Western (or European) interest in the ancient and modern history of the colonised regions that were a result, as well as a tool, of national competition and control, which extended into the realms of local memory and history. The productive element of thinking along these lines is obvious: a widening of the scope of the history of science induces a research reflexivity that sensitises practitioners of archaeology and Oriental studies to the context of their activities, and the formation of their practices. However, the approach may be also be developed in a reductionist mode, explaining the production of knowledge predominantly in terms of politics, power and control, offering a rather selective intellectual history. In a mostly sensible attempt to de-mythologise the history of Egyptology, complexities, constraints, as well as individual agency of researchers may be lost, and new ‘myths’ created by over-application of theoretical approaches. A diversified methodology might be more productive, including the adoption of a global concept of the history of science that emphasizes a hybrid production of knowledge. The symposium intends to address the position of Egyptology among histories of humanities and sciences, and the diversity of approaches to Egyptological historiography. Fundamentally, the panel seeks to probe the permanence and disruption of interpretive frameworks and their social and political situatedness, to develop and inform a wider understanding of Egyptological historiography.

Rocha da Silva, Thais (University of Oxford)
Brazilian Egyptology: Reassessing colonialism and exploring limits

Studies about ancient Egypt have significantly developed in Brazil since the last decade. This does not mean, however, that Egyptology is an established field in the reality of the Brazilian academy. This recent development has been accompanied by the expansion of Ancient History departments around the country and investments in archaeological research within Egyptian collections in Brazil. The absence of good libraries, ‘proper training’ as Egyptologists, the long distances to primary research centres in a continental country, and funding are among the difficulties faced by Brazilian students interested in ancient Egypt. Thus, whereas internationally, Egyptology has started reflecting on its own conceptualization and professional formation, Brazilian scholars are challenged to accommodate the traditional ways of doing Egyptology to the Brazilian academic reality. This leads to other challenges: how does a former colony take part in a colonial discipline while challenging colonial frameworks? Questions related to geographical distance, cultural differences, and varied backgrounds seem to justify the absence of an understandable reason why Brazilians could (or should) be interested in ancient Egypt. In this paper, I discuss Brazilian insertion into a global Egyptology, while examining the limits of this idea in Brazil. Moreover, I will discuss how interest in ancient Egypt and its relationship with the ancient world have been (re)shaped in recent Brazilian history.

Dodson, Aidan (University of Bristol)

Egyptology: a British model?

In contrast to the state-based ‘top-down’ processes through which Egyptology first developed in much of Europe, in the UK a much more ‘bottom-up’ situation has existed since earliest days of the, with minimal interest, let alone funding from central authorities. Indeed, Sir Gardner Wilkinson received his knighthood in part because he had achieved so much without state support. This paper will thus survey the history of Egyptology in the UK during the 19th century in contrast with that in other European states, with case-studies leading up to the foundation of the first UK chair in the subject – by private initiative, and some decades after the subject had become established in some other states.

Kóthay, Katalin (Museum of Fine Arts, Budapest)

Early Hungarian Egyptology in the context of patriotism and European identity

In Hungary, formal scholarly interest in ancient Egypt started in the last third of the nineteenth century. The road to institutionalization at the beginning of the twentieth century was a long one, and was preceded and accompanied by systematic collecting of Egyptian antiquities, education of the general public (organised travels and publications of translated foreign and Hungarian books in the field), casual courses on ancient Egypt offered at the Royal Hungarian University of Budapest, as well as by the first Hungarian archaeological mission in Egypt. This multifaceted process took place in a particular ideological and socio-cultural setting, which was characterized by a dispute on the primacy of national or European values. Addressing issues such as musealization and institutionalization, governmental support, ideological motives, and individual initiatives, the paper explores how, for the educated Hungarian, ancient Egypt represented European (not only universal) values, and how the new discipline of Egyptology was used to enhance both patriotism and European identity, or took a back seat behind national cultural issues.

Ketchley, Sarah (University of Washington, USA/Independent Scholar)

Nile Travel and Excavation in the Valley of the Kings 1889-1913: The Diaries of Mrs. Emma B. Andrews

“I now close this little record of the winter's travel, feeling assured that the pleasure of future reference to it, will more than atone for all the time I have given to it.” Mrs. Emma B. Andrews, ‘A Journal on the Bedawin’, May 16th 1890. In penning these words, Mrs. Andrews could not have anticipated that her journals would become a significant resource for the history of archaeology and Egyptology during the so-called ‘Golden Age’ at the end of the nineteenth and
beginning of the twentieth centuries. For over two decades between 1889 and 1913, Andrews traveled along the Nile with millionaire lawyer turned archaeologist, Theodore M. Davis, and was present when he discovered 18 of the 42 tombs now known in the Valley of the Kings. Her as yet unpublished eyewitness account is often more accurate than some of the official archaeological reports. The diaries are also a detailed yet under-explored commentary on the social and political history of Egypt at the time. Davis and Andrews became a nexus for turn-of-the-century society in Egypt, including scholars and archaeologists, politicians, landed gentry, industrialists, bankers, authors and artists. This paper will explore the valuable cultural, social and archaeological perspectives Emma’s diaries add to this period of modern Egyptian history. It will also describe ongoing digital humanities work to create new textual and graphical versions of diary content, based on an extensive database of contemporary biographies, correspondence, journals and photographs.

Navratilova, Hana (University of Reading)

Limits of hermeneutics of suspicion - Egyptologists in the Cold War

A biography, or life writing, focused on the individual, has been a so-called maverick genre in history writing (in particular regarding British historiography). As a part of history of science and humanities it has been increasingly superseded by social constructionist approaches, mobilizing social structures and formative paradigms, as well as social identities, as driving forces. This approach, mapping social and political context, is also known as the ‘hermeneutics of suspicion’, aimed at dispelling an idea of ‘value-free’ research. Yet there is a call for bringing the individual back into the narrative, or, at the very least, recognizing them as having a part in the formation of, as well as a resistance to, the agendas that influenced individual researchers’ lives and works. Survival strategies in difficult political regimes should, for example, not necessarily be taken at face value as representing seamless integrations of researchers into a political climate or into power structures. Case studies of two Egyptologists sharing similar aspects of their background, but operating on either side of the Cold War divide - Jaroslav Černý and Zbyněk Žába – will be used to illustrate examples of an individual agency in complex political and social structures.
I115  Historiography of Science

Location: SciM - Dana Studio    Chair: TBA

Hayes, Emily (Oxford Brookes University)

‘it’s the time, it’s the space, it’s the motion’: the chiasmus in historical geography

In his 'Scope and Methods of Geography' lantern-slide lecture of 1887 Halford Mackinder (1861-1947) conjured up the image of a 'new' geography whose purpose was the resolution of the malaises of modern times. Mackinder declared that 'One of the greatest of all gaps lies between the natural sciences and the study of humanity. It is the duty of the geographer to build one bridge over an abyss which in the opinion of many is upsetting the equilibrium of our culture.' (Mackinder, 1887, 148). In physiology the term chiasmus comprises the optical nerve in which images produced by each human eye, meet and fuse, thereby producing multidimensional images. In the twentieth century the concept was harnessed by philosophers, anthropologists, semioticians and historians of science (Merleau-Ponty 1968; Derrida 1981; Beer 1996; Baldwin 2004; Strecker & Tyler 2012; Wiseman & Paul 2014). As a rhetorical figure of speech, the chiasmus has been scaled up to become a symbol for structuring patterns of thought in a number of Levi-Strauss’s works (Wiseman 2001; 2009). In addition to the aforementioned works, this paper draws on scholarship on rhetoric, visual media and geographies of science. Via a discussion of the significance of magic lantern practices of the Royal Geographical Society in the founding, professionalization and popularization of geography in the 1880s and 1890s, and the changing rhetoric, imagery and conception of the subject by Halford Mackinder and others, this paper considers the unit of the chiasmus in geography and assesses its utility to historical geographers.

Tsai, Jia Chun (Institute of History, National Tsing Hua University)

Making up Galileo

In 1609, Galileo Galilei made his first telescope and used it to provide a strong argument for validity of Copernicus’ system of universe. Since then, the telescope became a “symbol” of Galileo. Numerous portraits of Galileo Galilei show the brilliant scientist with his telescope or his model of universe, or both of them. However, the instrument was not the only characteristic feature of the portraits of the Italian scientist. The paintings devoted to him fall into several categories, some of which are especially well known: Galileo demonstrating telescope to the Doge of Venice; Galileo interrogated by Inquisition; Galileo under home arrest; Galileo stating “And yet it (i.e., the Earth) moves”. Large number of these paintings was produced in the 19th century, when Galileo became one of “heroes” of the Scientific Revolution. The image of Galileo thus changed dramatically: a scientist became a hero. When this process of transformation started? How exactly this image of “hero” was constructed? What were the motives of the artists who represented Galileo in this way? What were their sources of information? In my paper I will analyze literary sources and portraits of Galileo in order to answer these questions using.

Alberti, Sam (National Museums Scotland and University of Stirling) and Inglis, James (University of St Andrews) and Volkmer, Laura (University of Edinburgh)

Historians of science and material culture: The immaterial turn?

Studies of things in the history of science are blossoming; and many of these things can be found in museums. Examples of collection use at National Museums Scotland include our own projects involving scientific acquisitions and typewriters. This paper will detail how we use artefacts in two of these endeavours: James Inglis’ study of typewriters and commerce in Scotland c. 1900, which engages with the rich collections of writing machines and auxiliary devices in Edinburgh and Glasgow to construct an experiential history of the typewriter; and how Laura Volkmer uses collections given by the University of Edinburgh to the Museum to understand ownership and intellectual property rights. We will outline the extent to which these projects illustrate a unity between curators and (other) scholars. Are we unusual,
however? Our presentation will go on to reveal the results of a survey of the presence/absence of objects in the published outputs of history of science and technology (following J J Corn’s 1996 study of the journal Technology & Culture). Among the many fine publications about material culture, how many historians use material culture? We consider whether the results indicate a broader disunity between museums and universities. Does this matter?

Loiodice, Eleonora (Università degli Studi di Bari “Aldo Moro”)
Culture: unity of knowledge. Giorgio De Santillana’s credit in history of science debate

Focusing on the theme ‘Unity and Disunity’, Giorgio De Santillana (1902-1974), a complex and eclectic scholar, studied the history of science and its origins from a particular point of view. This paper aims to show and underline Santillana’s credit in 20th century Italian cultural debate. Humanistic and scientific subjects were separated after Gentile’s reform of the Italian educational system in 1923. This dichotomy even affected the University model, in which philosophy was restricted to the Faculty of Letters, destroying Federigo Enriques’s idea of a single faculty, of a united vision about knowledge. One of Santillana’s teachers, he contributed within Italian cultural debate. Strong supporter of the idea of a unified and not divided culture, Santillana continued, in *Origine del Pensiero Scientifico* and other latest books, studying the history and origins of scientific thought, focusing on the primitive cosmology and analyzing myth existing all over the world. In ancient mythologies he found the same unity, in which the apparent difference between myths is seen as a puzzle that actually converges towards a unifying figure. The mythological language, talking about stars, constellations and movements of the sky is actually the first scientific language, because unifies mythology, astrology and astronomy in what today is considered science. In addition, in ancient time even mankind perceived itself in harmony and unity with the universe and nature, differently from now. The sources are books, press articles and original documents from archive as Harvard and MIT (Institute archives & special collections).

Rosenblatt, Louis (Independent Scholar)
On the Fleeting Unity of Sacred, Civil, and Natural History

By the early years of the 19th century, the long-standing project of a universal history uniting sacred, civil, and natural history was revitalized by the likes of William Jones, William Mitford, and Georges Cuvier. This was a matter of both bold claims and a common historiography. In the 1820’s this project began to be criticized, and soon a new project emerged which also unified sacred, civil, and natural history, but in a wholly new spirit. For example, a biblical chronological framework was abandoned altogether. In this new scholarship, notably Adam Sedgwick’s systems geology and the historical writings of Connop Thirlwall, the spiritual aspects were less matters of fact than a quality, a sense that the gods are not indifferent. By the 1860’s the spiritual character of this second project faded from view, a matter witnessed for us by William Whewell. What had changed so that the analytical unities no longer carried the unity of scientific and providential history? One factor was, no doubt, Darwin’s theory... even the miracle of miracles could be explained without God’s intervention. We turn to a letter from Sedgwick to Darwin expressing his sorrow that Darwin had abandoned final causes: it was God’s purpose which linked matter and morality. And we close by showing, contrary to common understanding, that Darwin too envisioned a universe that was not indifferent to our plight. Evolution, for Darwin, guaranteed humans are innately good.