



Ex Libris Michael Suss

82-1690

NEW YORK  
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8 GREEN STREET, BATH

11

111 KESNER (Crest): *Historia Antiqua Lib. I. in Quadragesima virginis, with  
Appendix, with numerous woodcuts, 1610, old calf (some and back-camp (old) leather),  
74 pp., 1610-4* 212  
Bound in 18th-century leather (half bound). \* See other small pieces and cuts of this book (bound),  
not returned to your care.

## COVER TO COVER: THE CONTRIBUTION OF THE BOOK TO THE REPRODUCTION OF LINEAR, HIERARCHICAL MODELS OF NATURAL HISTORY

Fritha Langerman

Isolated on a meranti library table, at rest on Perspex supports, is a book of 35 by 23 centimetres. Its full-calfskin binding is giving way to age and, peeling from the spine, the ruptured, pockmarked skin exposes fragile leaves of paper. Five raised headbands gesture at an attempt to stitch and contain 20 years of study within more than 1,150 printed pages, which are now seeping from their fleshy receptacle. The gold tooling has been abraded and the marbling on the foredge has faded with time. The open book reveals an emblematic frontispiece: two lions, rampant and coward, support a crown and shield emblazoned with eagles, surrounded by further heraldry.<sup>1</sup> Opposite this, on the endpaper, is pasted an Ex libris bookplate of a classical male bust, which marks this as the property of Michael Scott. Below this is pasted an auction entry for the book, 'Lot 144. GESNER, [Conrad], *Historiae animalium Lib. I, de Quadrupedibus viviparis*. £12.'



1. Rampant and coward lions are heraldry conventions: the former depicts the animal standing on two legs with paws raised and the latter depicts the tail between the legs.

This is the property of the University of Stellenbosch. Housed in the J.S. Gericke Library, it is a 1551 copy of Conrad Gesner's widely read Renaissance text on natural history, which was printed in Zurich, Switzerland, by the press of Christoph Froschauer. The two motifs of the bookplate and frontispiece introduce a Renaissance relationship between humans and animals. The classical male bust gazes at the heraldic lions, their codification signalling the value of symbolic meaning above the observational: species made visible by their proximity to culture. Gesner's book, published in four volumes – mammals, egg-laying animals, birds and marine animals – was the first encyclopedic attempt to list and chronicle all known animals while at the same time including mythological

creatures, such as the basilisk and monoceros (unicorn). It was also the first bibliography of natural history writing, Gesner having published the first independent bibliography, *Bibliotheca universalis*, in 1545, which alphabetically listed 1,800 authors with titles and content notes.<sup>2</sup>

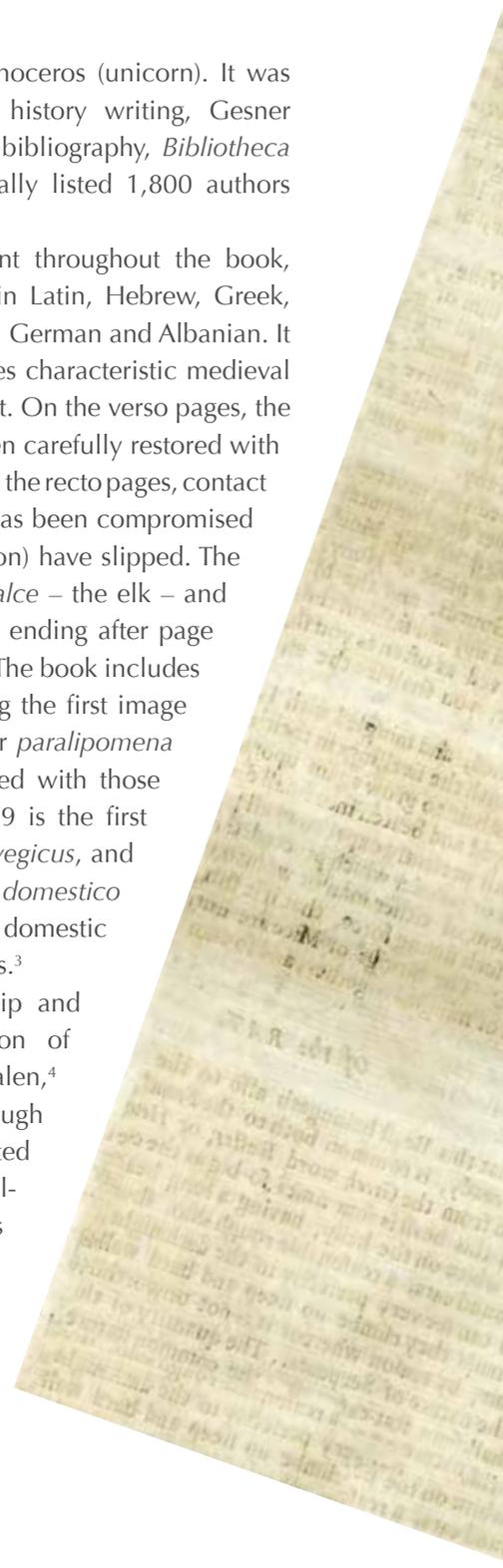
Gesner's systematic vision is evident throughout the book, which contains an alphabetical index in Latin, Hebrew, Greek, Persian, Italian, Spanish, French, English, German and Albanian. It begins with an introduction that includes characteristic medieval marginalia on either side of the body text. On the verso pages, the printed headers *epistola* (letter) have been carefully restored with paper bandages on a number of pages. On the recto pages, contact between paper and ink-charged metal has been compromised and the headers *nuncupatoria* (dedication) have slipped. The description of animals begins with *De alce* – the elk – and makes its way through the quadrupeds, ending after page 1104 with *additiones* and *castigationes*. The book includes animals from the New World, exhibiting the first image of a guinea pig and possum in the latter *paralipomena* section of the book, which is concerned with those things previously omitted. On page 829 is the first description of the brown rat, *Rattus norvegicus*, and the section on mus reads, '*de maiore domestico mure quem vulgo rattum vocant*' of a domestic mouse, which is commonly called Rattus.<sup>3</sup>

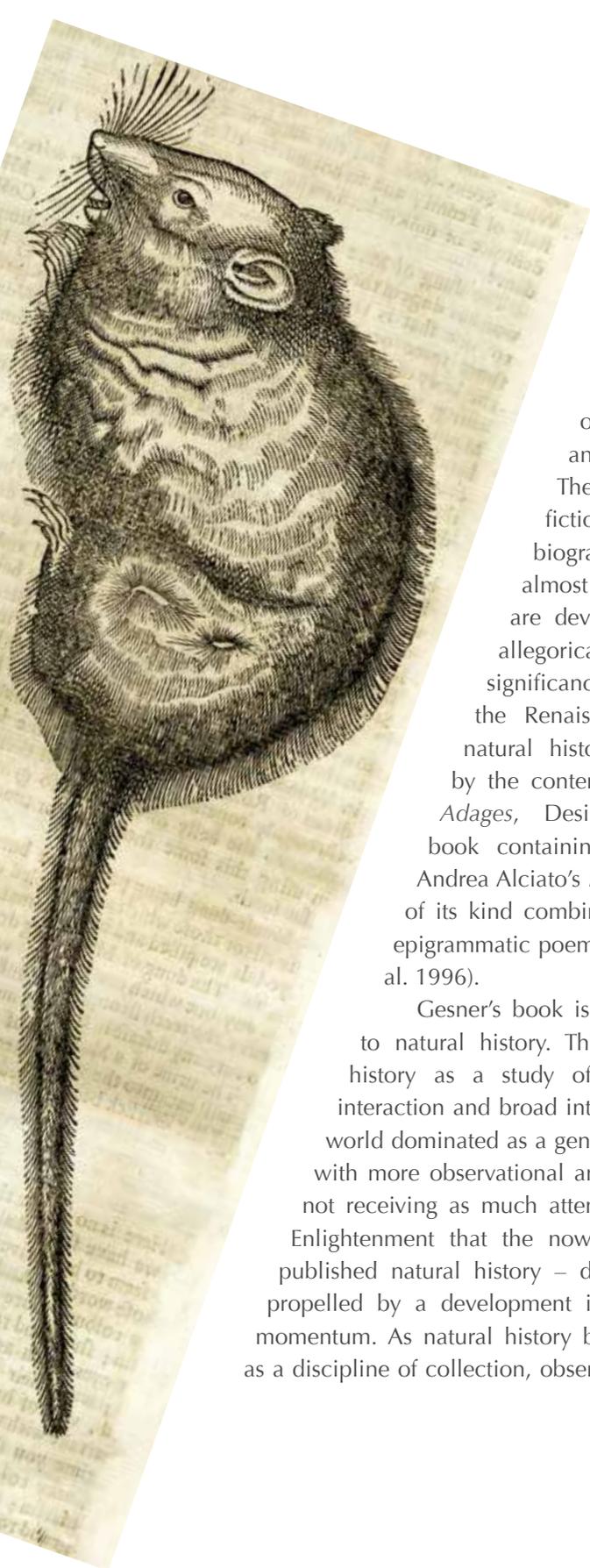
The book is a hybrid of scholarship and imagination. Drawing on the tradition of classical texts by Pliny, Aristotle and Galen,<sup>4</sup> which approached natural history through descriptive text rather than illustrated observation, it also alludes to the symbolism of the medieval bestiary and includes the first naturalistic observations of animals, although the seemingly detailed observations are fairly generic and not particular to specific

2. Gesner's Protestant beliefs were believed to infiltrate his writing and this publication, together with the *Historiae animalium* was placed on the *Index librorum prohibitorum* in 1559, the list of books prohibited by the Catholic Church.

3. This reference pertains to my exhibition at the SA Museum, R-A-T in 2012/13. This exhibition responds to the legacy of linear display within natural history museums.

4. Aristotle's *Historia animalium* (350 BC) was entirely textual and Galen was known to distrust illustration as a distraction from the truth and clarity of text.

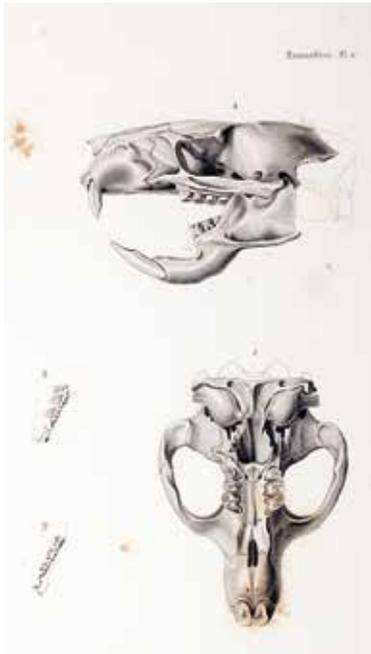




species. Gesner's texts on various animals are wide-ranging, including myth, legend, epithets, metaphors, contemporary observations by naturalists and anecdotal notes.<sup>5</sup> The interwoven facts and fictions provide a rich cultural biography of each animal as almost a third of his studies are devoted to the literary and allegorical. This reinforces the significance of the symbolic in the Renaissance understanding of natural history, which is supported by the contemporaneous publications *Adages*, Desiderius Erasmus's 1500 book containing 4,000 proverbs, and Andrea Alciato's *Emblemata*, the first book of its kind combining mottos, images and epigrammatic poems (Ashworth in Jardine et al. 1996).

Gesner's book is a marker of an attitude to natural history. This perception of natural history as a study of human understanding, interaction and broad interpretation of the natural world dominated as a genre for the next 100 years, with more observational and objective publications not receiving as much attention. It was only in the Enlightenment that the now more familiar form of published natural history – description and anatomy, propelled by a development in optics – was to gain momentum. As natural history became more specialised as a discipline of collection, observation and classification,

5. Although I have examined this book closely as an object, the Latin text renders it fairly impenetrable to me. For this I am reliant on the essay by William Ashworth, 'Emblematic natural history and the Renaissance' in Jardine et al. (1996).



Images taken from Theophile Lefebvre's Voyage en Abyssinie pendant les années 1839–43 in the folio collection of the Iziko South African Museum.



it started to move outside literary and historical reference. A comparison can be made here with the shift from the similitudes and the rich cross-referencing of the Renaissance *wunderkammer* to the disciplined displays of the Enlightenment collections.<sup>6</sup> The encyclopedic enterprises of the eighteenth century demanded a classificatory system that forsook the visual in favour of a geometric system that looked to difference and identity as ordering principles. Linnaeus's interest was in textual ordering and his binomial nomenclature in combination with the table *regnum animale*, published in *Systema naturae* (1735), presented an enduring image of the animal kingdom divided textually into classes of progressive complexity.

While the museum of natural history has been both the public front and the repository of collections, the natural history book has been the interface at which collections have been anatomised, ordered and translated. From the initial Renaissance collections to the contemporary museum, the relationship between objects and

6. Foucault expands the theory of resemblance and its significance to the Renaissance in *The Order of Things* (2002).

paper publications has been closely connected.<sup>7</sup> Careful analysis and observation of study collections resulted in companion ‘paper museums’ of books and folios. In some instances the book becomes the archive of the physical collection. With its portability it stands for the material archive, overriding the significance of the collection itself.<sup>8</sup> Illustrations become definitive, while the collection often remains impenetrable, inaccessible to the public beyond the boundaries of accession and interpretation by those initiated illustrators. Georges Cuvier’s *Le Règne animal distribué d’après son organisation* (1817) provides an example of this. Based on specimens from the Muséum national d’histoire naturelle, Paris, it is valued for its taxonomic organisation of species and for its exacting illustrations. The specimens themselves are forgotten.

The advent of the printing of books and the development of movable type in the 1450s presented an unknown territory with endless possibilities of form. The conventions of the printed page and the composition of the text and images were initially inherited from the richness of medieval manuscripts. As cost and efficiency began to be factored into production, new standard relations of print began to limit the possibilities of the book and introduce expectations as to the presentation of information. In contrast to the book was a tradition of the large-scale atlas or folio print – individual, unbound annotated illustrations – which presented natural history in a more fluid, multilinear way. Prints could be viewed independently and in any order, whereas the book fixed images into a progressive, ordered hierarchy.

My framing interest in this area is the perpetuation of linear, hierarchical models of speciation within natural history museums. I believe that museum display has not responded to contemporary ways of understanding speciation or knowledge, choosing to adhere to a visual methodology that recalls tree-like, discrete divisions of nature.<sup>9</sup> In other writing I look more closely at how this linearity is driven by a Christian inheritance in the iconography of evolution and display.

In this essay, however, I wish to focus on the impact of Christianity on the form of the book and suggest that, when seen

7. Lynn Nyhart, in her essay ‘Natural History and the “new” biology’ (Jardine et al. 1996) describes the late nineteenth-century division between natural history and the new zoology/botany. Universities established biological laboratories focusing on morphology and embryology while museums became autonomous entities and the home of systematics.

8. The paradox of this relationship is that the mobile book brings knowledge to the people, while the fixed museum brings the people to the site of knowledge.

9. Research in bio-informatics, which allows for the most intricate analysis of genomes, indicates that species transfer genetic material between one another fairly regularly – horizontally rather than vertically – and that evolution may better be visualised as a rhizomatic web. This is a complex set of arguments that are part of a wide discourse. In popular science writing, this implied interconnectivity of life has been articulated by many authors, including Fritjof Capra and Richard Dawkins. Capra’s book *The Web of Life* presents further evocations of his take on systems theory, and he sets up a stark contrast between Cartesian, reductive, mechanistic frameworks and a web-like structure, the interconnectedness of which he applies to ecological, biological and social systems. Similarly, Dawkins draws attention to the ‘tyranny of the discontinuous mind’, emphasising that speciation is not neat or delineated, but is filled with intermediacy. As Stephen Jay Gould had done before him, he points to the dominance of the image of evolution as progressive and intentional, revealing the false delineation of the inevitability of the origin of man.



ficus, & habet spinas in modum acutum; confimilis in medendo facultatis, praestantior in cibo, multo  
 stomacho, & uentrem magis mollit, urinamq; ciet efficacius. Haec rasis & Albertus. Sed apud Ges-  
 cos facultates istae echino marino attribuantur. Vetus glossographus Auicenna, uocem adallan, a  
 ricium montana interpretatur Syriaticus adualdul & adubul, similiter; & in lingua nostra (quod  
 uocantur dvice. Aliqua secundum aliquos est ericius magnus spinosus, secundum alios ueris  
 us minor, Andreas Bellanensis. Albertus hylicem etiam succa nominare uideatur, nescio quae  
 gna, ut in B. referam. ¶ Syriaticus & alij recentiores hylicem animal quod uulgo porcus spinosus  
 dicitur, interpretantur. Sic & Graeci quidam, ut Suidas, acanthochoeron, quod idem sonat ut  
 humiled & uulgarem echinum terrestrem eodem nomine uocitant, Etymologus & Varinus. Quod  
 uero hylicem quoq; echinum terrestrem Suidas interpretatur, falsum est. Syriaticus etiam animal  
 dicitur.

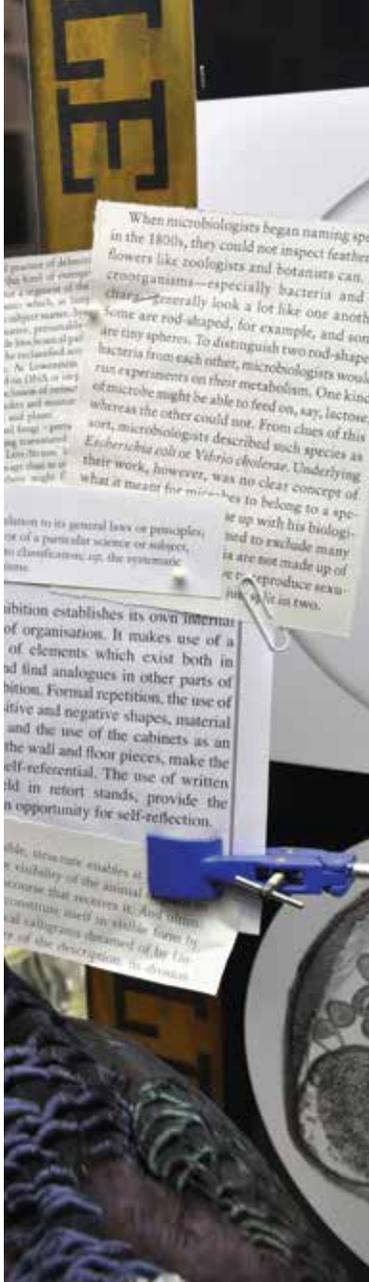
within the context of books of natural history, ancient notions of hierarchy of being – the *scala naturae* – are resident within its structure. The book has provided the instructive model on which display within museums has been based. This idea is complicated by the presence of images within books, and two questions that emerge are: how did the introduction of illustrated texts change the reception of ideas that were previously presented solely as text, and what is the role of texts and the book as a form in the transmission of scientific knowledge?

### Paper cabinets

The representation of nature in visual form is never neutral and can, to some extent, be explained by the metaphorical apprehension of nature as simultaneously a book (a text to be read) and a territory (a place to be conquered). As a book, nature is finite and can be organised, while as a territory, it is unknown. The extent of this mastery of nature through the visual was, for centuries, complicated by the relationship to divinity – ultimate mastery and creation – and the morality of reproducing nature. The inclusion of illustrations within books of natural history was a feature of the late Renaissance, which was coincident with the reduced control of the church. Many of the classical texts that saw a revival as illuminated manuscripts in the thirteenth century were purely textual, and included Aristotle's *Historia animalium* (350 BC),<sup>10</sup> Isidore of Seville's seventh-century encyclopedia *Etymologiae*,<sup>11</sup> Theophrastus' *Enquiry into Plants* and *On the Causes of Plants* (c.300 BC) and Pliny's *Naturalis historia* (AD 77) (one of the first classical manuscripts to be printed, in 1469). Illustrations here were limited to simple diagrams and the illuminations were incidental to the text and did not extend arguments or findings in visual form. In 1543 three significant scientific works that used observational illustration to support theory were published: Fuchs' *De historia stirpium commentarii insignes*, Copernicus' *De revolutionibus orbium coelestium* and Versalius' *De humani corporis fabrica*. There remained, however, few examples of pictures of animals in books. Medieval bestiaries, which provided a compendium of the

10. Seen as the progenitor of natural history writing and popularised to the modern audience by the D'Arcy Thompson translation of 1910.

11. This compendium of 20 books quoted from more than 150 classical authors and included topics from grammar to ships. It contained diagrams and illuminations, but not illustrations. Its structure is not dissimilar to Diderot's eighteenth-century *Encyclopédie*.



Images on pp. 32–39 from *Subtle Thresholds*, an exhibition by Fritha Langerman at the Iziko South African Museum, 2009–2010.

12. The tree of life as a complex symbol of science and Christianity. I refer to this more extensively in other writings.

symbolic, largely Christian significance of animals, were, prior to Gesner's book, the only instances. The struggle between the textual and the visual for primacy of knowledge dissemination came to the fore during the sixteenth century. In his book *The Eye of the Lynx*, a study of the natural history drawings by Federico Cesi and his Lincean Academy, David Freedberg discusses this late Renaissance contribution to scholarship and the debate surrounding the usefulness of illustrations. The study and interpretation of classical texts was, at this time, seen as one way of studying nature that, in deferring to Galen's terms, was not distracted by images. This recalls Plato's objection to mimesis in the *Republic* books VII and X, in his claim that forms hold an ideal truth and that artists are mere imitators of that created by the gods: their work is based on appearance, not virtue. In the Renaissance understanding of natural forms, and working towards a method of ordering them, it was believed that, in accordance with Aristotle, forms should simultaneously reveal their similarity and difference. Illustrations were unable to perform this at once and were consequently believed insufficient and limited in their ability to translate complex ideas and systems. Additionally, it was believed that, as images presented singular views of objects, they were unable to reveal the 'essence' of what was depicted. Linnaeus disputed the value of images in the expression of biological systems in that he believed images to distort and camouflage, and thus advocated a reduction to geometric essentials.

The Enlightenment's emphasis on the ordering of specimens championed the philosophy of 'truth-to-nature'. This was the manual elimination of the variability of nature and the anomalies of the specimen in favour of generality and fidelity to type. The inclusion of irrelevant details ran the risk of misclassification. This was challenged by nineteenth-century objectivity and the mechanised photographic image that reduced human intervention in documenting specimens (Daston & Galison 2007). Although its veracity could not be disputed, the photographic image was an unmediated illustration of specimens. This conflict between truth and objectivity remains a central issue in the history of

representation in science. This points to the persistent problem in scientific illustration: the general over the particular – how individuality and the variability of nature is sacrificed in favour of the ideal form or typical specimen. In more contemporary terms, this pertains to the depiction of speciation within natural history museums: in order to satisfy the idea of a species occupying a specific unit of the tree of life,<sup>12</sup> the idealised exemplar needs to be identified, both within the printed book and within the museum cabinet.

If we return to the drawings and paintings produced by the Linceans in the late 1500s, their attempt at veracity and accurate representation of individual form is remarkable. Produced only some 50 years after Gesner's publication, watercolours by Vincenzo Leonardi show detailed and particular anatomical renderings of plants and animals. All emblematic reference has been lost and the project is unapologetic in its aim to classify and order all human knowledge and catalogue all living things with as close a fidelity to nature as possible. The understanding of texture, colour, shape and animation is extraordinary in these works and, in many cases, the cropped, organic compositions set them in a contemporary mould. In his book, Freedberg presents these images in contrast to Mattioli's woodcuts from 1585, where the formalised, rigid and diagrammatic representations sit in stark contrast to the watercolours, which are not constrained by the format of the page. Perhaps this comparison has much to do with the difference between painting and printmaking and the inevitable codification that comes with translation from the former to the latter. However, it is apparent that the Lincean images emerge from a different set of intentions. Cesi contrived to collect and observe a full record of the natural world before drawing any theoretical conclusion, particularly fossils, fungi and plants not previously mentioned by Aristotle or his followers. A primary need was to find form for that not found in antiquity – a means to reveal the creation in an appropriate form.

Cesi and his group were the first to use a microscope (Galileo's) to observe specimens, decades before the publication of Robert





13. I also wish to suggest that Gesner's *Historiae animalium* operates within the iconography of 'webness' in that although species are described discretely, their enmeshment within a cultural landscape opens their definition.

Hooke's *Micrographia* of 1665, and were thus able to see detail previously undetected. However, this close observation was to present a new set of problems. On close inspection, specimens started to reveal structural internal patterns that made unexpected connections between species. Interiors were more similar than exteriors suggested, hinting at an organisation that challenged previous classificatory systems. There were also discrepancies between observed and known forms, as specimens displayed both particular and anomalous features. Presented with the dilemma of occluding or exaggerating characteristics, Cesi was to conclude that the image was doomed to failure. 'Picture making, they began to understand, was fundamentally descriptive and synthetic; it stood at odds with order and analysis' (Freedberg 2002, 5).

The vain attempt to reproduce faithfully what was observed resulted in a categorisation of specimens that is of pertinence to my study. Although Cesi searched for a unique marker that would identify species as distinct and make for an easier classificatory system, close inspection produced less rather than more clarity. In his incomplete *Mirror of Reason* he had a category for 'things of doubtful nature, or doubtful species, or ambiguous things . . . Two different natures joined in a single species . . . species participating in two natures' (in Freedberg 2002, 183). Barbara Stafford (1998) describes the eighteenth-century conundrum, for those wishing to classify, that followed the invention of the microscope. In minute examination, organisms revealed similarities and differences as before unseen and some seemed to fall into 'betwixt and between' categories. This assisted in breaking down what she terms the 'hegemony that the integral human body held in the West and loosened the grip of anthropocentrism' (Stafford 1998, 230). Animalcules and infusoria became part of a 'rococo vocabulary of decorative hybrids' (Stafford 1998, 233). This indeterminacy of species – the hybrid, partial, hermaphrodite – that does not easily conform to set classificatory systems can perhaps be extrapolated as a metaphor in approaching 'the web of life' as an icon. Although species may be morphologically distinct, their phylogeny is more porous and less willing to conform to distinct boundaries.<sup>13</sup>

### Structured pages

The fifteenth and sixteenth centuries saw a radical shift in the understanding of the world. Copernicus and Columbus enabled the notion of a constantly expanding world – one that brought finite systems into doubt and interrogated the foundations of what it meant to be human. At the moment when the social and natural world became symbolic territory to be divided and ordered, the printing of books was invented and became a complicit agent in the generation of a particular world view. Print, as a medium, is always bound to an ‘other’ – recalling a state outside itself. It is constructed by oppositions – matrix and impression, original and reproduction, negative and positive, oil and water, depth and surface – and so, as a practice, exhibits a binary taxonomy that echoes Enlightenment symmetrical classificatory order – a system that recognises the symmetry of nature as evidence of God’s power. As an innovation, it suggests a network of relationships between object and text, object and image, and image and text that are less binary and more nuanced. The printed image is a multiple of a reproduction of an illustration that was an interpretation of a specimen. This recalls Derrida’s claim that ‘there is no outside-text’ (1976) in that the world is structured through texts and the only means of referring to this is through representations. That the object cannot escape its rendering, and is always constituted by deferral, is a contemporary consciousness that acknowledges that any object in a museum is only understood in relation to a host of previous images in books and other media.

The printed book divided the known world into sections of text and units of consecutive visual information – a conceptual shift that was largely driven by technological innovation. Technology is the means through which the knowledge of natural science is disseminated, and technology also impacts on its visualisation and articulation. It is in the translation of images to print, reproduced and standardised within sequential structures, that an understanding of nature is built and maintained. Nature is, by implication, produced by its visualisation through print technology.<sup>14</sup> The print in book form has been a determining



14. Martin Heidegger (1977) is of reference here. He inverts the commonly held notion that science produces technology by suggesting that technology is in fact instrumental in the production of both truth and science. Heidegger is concerned with ontological presence and the manner in which phenomena are revealed or, as he describes them, come into being or bringing-forth. Technology defines itself in this process of presencing. The essence of becoming can only be realised through technologies, as they provide access that would otherwise not exist. It is in this revealing that technology becomes conflated with truth, and here he draws a parallel between the role of the artist and that of technology in performing this role of revealing or ‘bringing the body into being’ (*techné* deriving both from craft and fine art and from knowing).

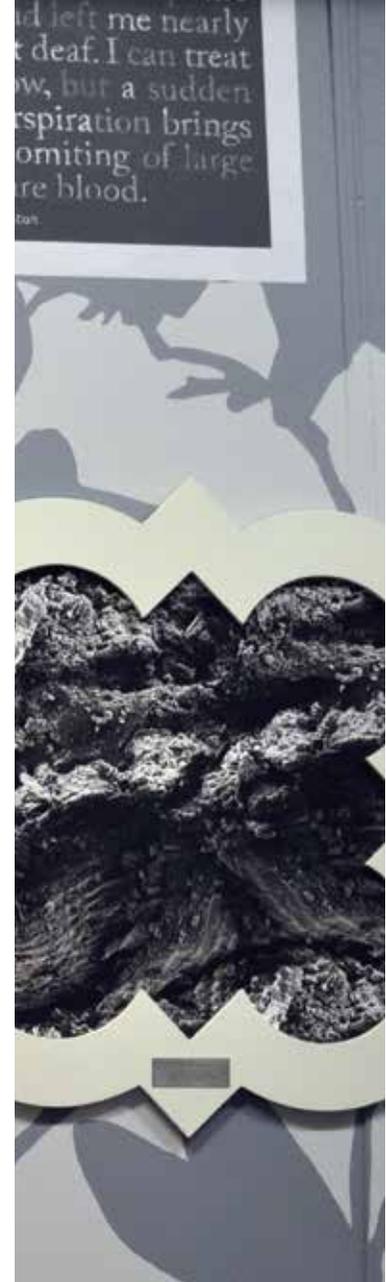


When the people began to fear that *ndui* might arrive among them, six young men went to get *dawa*. That night a voice was heard repeating 'they have come to get me'. A few days later all the young men were *...*

feature in the perpetuation of linear models of knowing the world. Not only were ideas of classification, taxonomy and evolution communicated through the book, forming part of the reproduction and replication of those systems, but underlying linearities were supported by the codex structure, presenting a constrained and hierarchical ordering of material, not least of all linked to its origins in the church.

The development of the book as a material object, and the manner in which that object is received, are critical to any argument which suggests that form impacts on meaning. This point is made by Roger Chartier, who notes that when writing becomes a book, attention needs to be paid to the role of the physicality of the object in its transmission (1994, 10). Text is written independently of the conception of the book as object, resulting in a space between text and object – the space in which meaning may be generated. Chartier suggests that the aesthetics of reception have been overlooked and that the historicisation of the ‘reader experience’ has been based on literary conventions rather than presentation of visual object.<sup>15</sup> If the form of the book is seen to constitute its readership and reception, it is fairly apparent that the relationship between the book and scientific authority is constructed through its design, organisation and illustrations, in proportion to the values of the time.

The codex book is both binary and sequential in its form, centrally stitched and held between two equal covers. The symmetry of the open book means that pages are viewed in relation to each other, while the frontispiece and colophon included in more traditional books literally sandwich the contents of the book between a visual explanatory narrative and a textual reflection. The conventions of the structure and divisions of the book imbue the book with a temporality, as, through a slow process of disclosure, its contents are revealed over time. Stoicheff and Taylor describe the book as a complex instrument that is ‘never fully encountered except as an expectation or recollection or closed volume’ able to ‘hold meaning in suspense’ (Stoicheff & Taylor 2004, 3, 29). They draw attention to the significance of layout and orientation of the



15. This was part of a movement in the late 1980s towards a theory of the book that included literary theory, the history of the book, its production and its reception – how it is understood as an object and how that differentiates meaning – which includes Don McKenzie, Roger Chartier and Robert Darnton.

16. Disciplined typographic layout with pages of continuous text was to dominate printed books from the sixteenth century. This was only disrupted by the typographical revolution by the Dadaists, Futurists, Cubists, and Constructivists at the beginning of the twentieth century.



page in that its conventional verticality encourages a hierarchical arrangement of ideas, reinforcing a particular world view. The vertical page and sequential organisation of information were to mirror a view of natural history that arranged species in groups of varying and increasing complexity and separated animals from much human endeavour.

While the production of books was under the control of the church, the institution exercised control over the hierarchy of information. As soon as the book was liberated from the confines of the church, the structure of the book had to provide the hierarchical structure for that information. The consecutive page, the structure of the block of text within margins and text that runs from line to line create an expectation – a sense of development or evolution of a text or narrative. The continuity of lines of text, running along horizontal axes and broken only by pagination, also recalls an imagined transcription of a spoken language and reflects the orality of text. In this there is a sense of divine intervention – the spoken word of God transcribed. Natural history from the sixteenth to eighteenth centuries capitalised on this association – the role of natural history being to reflect God's work and creation, and Linnaeus, too, saw himself as revealing the work of God. The form of the text was thus critical in establishing the authority of science, linking it to the ultimate authority.

As natural history developed as a discipline, so did the format in which it was presented. Books written on vellum were individually unique. Each sheet was separately pared, dried and treated for inscription. With the advent of printing, however, the production of paper began to be standardised. Endless sheets of paper as part of a production schedule necessitated a standardised format that mirrored the form of production. The formal layout of a textual page is instrumental in communicating intellectual content and directing the act of reading. This has changed enormously throughout different periods and, interestingly, there emerge some parallels between medieval and contemporary design frameworks.<sup>16</sup> The medieval manuscript constructed page layout as an organic form that in many ways reflects current layout or

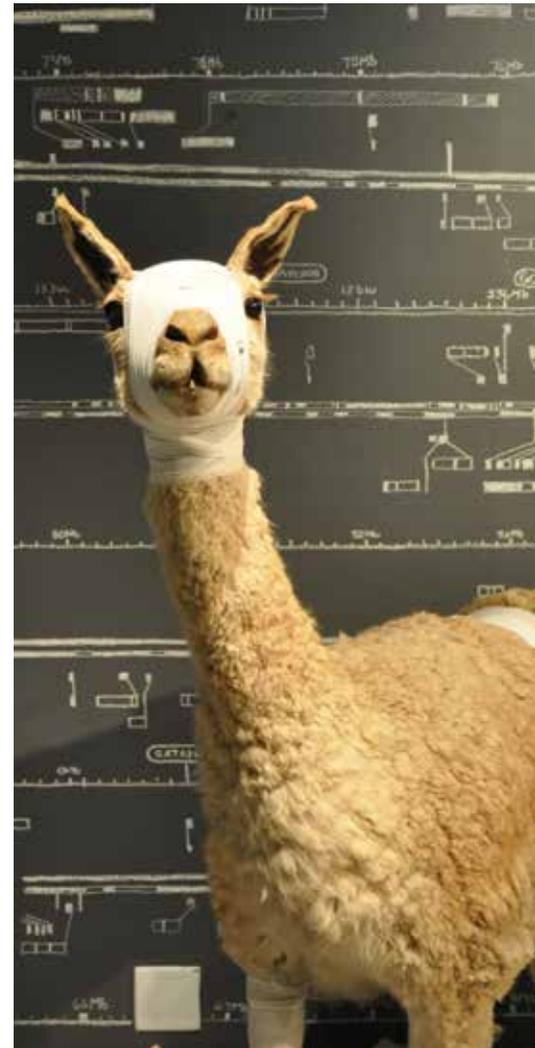
web design. There was logic to various sections of the text that were produced in different scales and scripts. The central text would be surrounded by commentary in margins with further commentary by scribes beyond that, leaving additional space for the reader to add marginalia. The text was thus increasingly fluid, self-reflexive and self-referential.<sup>17</sup> The creation of the blank space in the text became a place of insertion of the reader – a space in which the reader could make connections and determine, to an extent, the interpretation of the book. Open layout allowed for open interpretation and this is revisited in the contemporary digital space of hypertext. Interestingly, as the discipline of natural history developed at the same time as print technology it is framed between the space of medieval and contemporary – the space of the non-responsive reader.

In the medieval manuscript, the margins were the place to establish a relationship between the reader and the text – the text was a territory to invade or to exclude. The margin was the space of the reader's authority, reversing centre and periphery. With standardised printing, the margin and open space had a different use. Chartier (1994, 11) speaks of the 'triumph of white over black' introduced by new spacing in eighteenth-century printing. This allowed for increased white gaps on the page and the use of paragraphs to clarify arguments in a manner that discouraged the reader to add comments, which returned authority to the text or image itself. While in the early years of printing, piracy and plagiarism were rife within the reprinting of texts, and texts were not reliable,<sup>18</sup> by the eighteenth century printing came to be associated with the visual articulation of fixed ideas. The development of the printed book expanded access to texts and readership, yet it created a passive reader – the recipient of knowledge who deferred to the printed text as active authority.

Printing not only introduced a new formal language to the book, but its affordability resulted in a proliferation of printed material that accentuated a problem that arose during the production of medieval manuscripts. Books of natural philosophy were increasingly revised, annotated and reproduced

17. Manguel (2004, 30) notes the evolution of the medieval page of text as a complex set of cross-references or acrostics and provides the example of a version of Aristotle's thirteenth-century manuscript of *Parva naturalia*.

18. Adrian Johns writes extensively of the non-fixity of print in *The Nature of the Book* (1998). Here he proposes that early print was not reliable or repeatable – contrary to the conventional view of 'print culture' as espoused by Elizabeth Eisenstein in her canonical *The Printing Press as an Agent of Change* (1979). Unscrupulous printers disregarded the integrity of the author's text in the interests of expediency and efficiency.



19. Ann Blair (in Frasca-Spada & Jardine 2000) writes extensively about the anxiety created by the volume of texts and the responses to this.



and the response by printers was to use internal referencing systems to formalise the selection and access within books themselves.<sup>19</sup> Medieval scholars were encouraged to keep a ‘commonplace book’ – a notebook with selected quotes and texts of personal significance. The increased availability of books in the Renaissance made this an essential part of scholarly practice. The recognition of a need to develop a system to order and classify information resulted in the bibliography, and here Gesner’s work is again of significance. In addition, the design of the index, footnotes and contents pages within books became increasingly important and came to stand for the commonplace – the mnemonic that provided access to the dense text. Printing had introduced the need for a chronology of knowledge and a linearity of content, and from this point the predictability of the structure of the progressive book could be said to determine the manner in which the contents were understood. The contents’ structure became increasingly considered, culminating in examples such as Diderot and d’Alembert’s tree-like organogram, the ‘System of Human Knowledge’ used in the *Encyclopédie* (1751–66), dividing knowledge into three branches: Memory (history), Reason (philosophy) and Imagination (poetry). Similarly, Chambers’s contents in *Cyclopaedia* (1728) made use of a schema based on a horizontally orientated Porphyrian tree. Classificatory systems devised for books thus developed in tandem with ideas for the classification of natural systems. Chambers explained in an advertisement for *Cyclopaedia* that ‘The Character of this Work is to be a DICTIONARY, and a SYSTEM at the same time. It consists of an infinite Number of Articles, which may either be consider’d separately, as so many distinct *Parts of Knowledge*; or collectively, as constituting a *Body* thereof’ (quoted by Yeo in Jardine et al. 2000, 215).

Encyclopedias (the word is derived from ‘circle of knowledge’) stressed connections between ideas over dominant structure and aimed to reveal the connection between subjects, again anticipating the hypertextual. Yet this was thwarted by alphabetisation – an arbitrary system of order that was seen to disrupt a ‘natural’ order

to knowledge. The dictionary and encyclopedia were to stand in place of a library for many, in response to what was seen in the seventeenth and eighteenth centuries as a proliferation of books, which Chambers called a 'reduction of the vast bulk of universal knowledge into a lesser compass' (quoted by Yeo in Frasca-Spada & Jardine 2000, 212). The scope of the encyclopedic project allowed for infinite complexity and philosophical reasoning, while the structure of the book form allowed for cross-referencing. For the first time, different sets of ideas could be viewed comparatively in a single form.

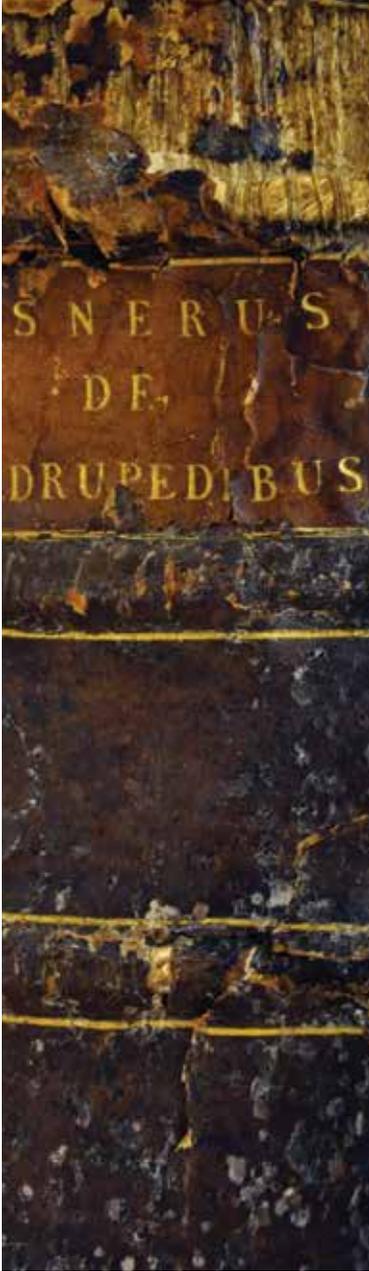
The understanding of the book as an object that serves knowledge is given, yet a close reading of its etymological roots hints at a more complex relationship between knowledges. These roots are the Greek *biblia* – the plural of *biblion* – which became the 'book' of books and of sacred scriptures (*biblia sacra*), and *biblos* (the inner bark of papyrus), which became *bibliothêke* (house of papyrus), meaning wisdom or knowledge.<sup>20</sup> The book was thus always positioned as an object straddling religion and learning.

The experience, and thus associative understanding, of early scroll books is vastly different from the codex. The early scroll presented what may appear as the ultimate in linear form: a continuous passage from one end to the other, bound between rollers. In a scroll, only portions of the book are revealed at a time, promoting sequential access, with no imposed unit of text. The form of the rolled book meant that the content did not always coincide with the form, and sections of books frequently resided on different rolls in autonomous sections. The codex form (*caudex* is Latin for 'trunk of tree' or 'block of wood') is understood as a Roman invention developing from *linthei* (linen books)<sup>21</sup> and wooden tablets, which became the dominant form of book by the fourth century. The codex form includes stitched and folded sheets of vellum or paper within a bound cover. In contrast to the scroll, which physically and conceptually separated textual units, the codex brought disparate units together, providing a uniformity and sense of the whole. The codex thus started to shape knowledge as a singular body of

20. Walter Mignolo discusses the form of the book in some detail (Rothenberg & Clay 2000).

21. The papyrus scroll was introduced to Rome from Greece in 180 BC along with entire libraries brought as war treasures. This promoted the rise of the rolled book, the *rotulus*, which was held between two sticks, held above with the right hand and unrolled with the left.





22. The Bible is the book of books. Etymologically it derives most recently from the Anglo-Latin *biblia* (fourteenth century), which derives from the Greek *biblion* – paper, scroll or the commonplace term for book. The Christian scripture was referred to as *Ta Biblia* in Greek in the third century (*Online Etymology Dictionary*).

ideas rather than fragmentary and independent. The rectilinear page is a framing device that contains a single spatial unit, and the structure of recto–verso pages of the codex sets up a binary opposition between pages.

Christianity quickly absorbed the form, particularly for the transcription of the New Testament. It serviced the poor Christian community as a more affordable method of book production, as it required smaller sheets and both sides of the papyrus could be used. Biblical books are not strictly sequential and the codex form allowed for easy reference between books of the Bible (De Hamel 2001, 49). The conversion of Rome to Christianity solidified the book as the dominant vehicle of knowledge, and the growth in the popularity of the codex coincided with the growth of Christianity.

The classical philosophy of Socrates and Plato held knowledge to reside in the psyche and promoted the orality of knowledge. Christianity, however, referenced a form of authority outside the self and embedded knowledge within graphic representations and the form of the book. The book replaced the individual as the source of information and, at the same time, within a set of complex symbolism, the book became the ultimate authority – that of the word of God. Mignolo (2000, 362) makes the significant point that when word detached from the orator (physical body) it became attached to the silent voice of God (invisible body).

The idea of the book and the word of God are highly interchangeable throughout the Bible.<sup>22</sup> Here, two tropes relevant to my study come together – book and tree: the book of God, the book of life, the tree of life and the tree of knowledge. Although the transcription of the word of God has Judaic origins, the integrated symbol of God as a book and as the Word emerges strongly in the New Testament, where Jesus is conflated with the Word of God. In the Gospel of St John we read, 'In the beginning was the Word, and the Word was with God, and the Word was God. He was with God in the beginning. Through him all things were made; without him nothing was made that has been made. In him was life, and that life was the light of

men . . . The Word became flesh and made his dwelling among us' (John 1:1–4, 14).

The Word of God is what creates and is spoken, but is also the written Word as presented in the Bible. God's Word becomes flesh in Jesus – a conduit of both *logos* and *rhema*: the written and the spoken word. Jesus is present at the origin of the world with the Word – and is both the text and the book. To misquote Derrida, nothing exists outside the text.

At the conclusion to the Christian Bible, in Revelation 10:9–10, the book appears again, 'I went to the angel, telling him to give me the little book. He said to me, "Take it, and eat it up. It will make your stomach bitter, but in your mouth it will be as sweet as honey." I took the little book out of the angel's hand, and ate it up. It was as sweet as honey in my mouth. When I had eaten it, my stomach was made bitter.' In this act of eating, John assimilates the Word of God. It is also a physical act – dysphagia, or the inability to swallow.<sup>23</sup> The book is present at the beginning of time in Genesis and at the end of time in Revelation. This suggests a binary, a finite event – human life as pages between two covers – between two points in the history of the earth.

Christ is the Word made flesh – the physical manifest as a book. Skotnes (2005, 6) reminds us of Christ as a book on the cross: 'his back hung against the spine of the cross, his arms and legs the splayed pages on which the story of sacrifice and redemption is written in the blood of his wounds.' Here the simultaneous symbolism of the book and of the tree is life is recalled. Bibles and holy texts were literally the Word made flesh. The Torah was said to be copied by Moses on to a scroll made from the skin of a kosher calf, and early Bibles etched text with caustic ink on to vellum made from calf, sheep or goatskin.<sup>24</sup>

Alejo Venegas, a professor of rhetoric in Spain in the 1540s, defined the book as 'an ark of deposit in which, by means of essential information or things of figures, those things which belong to the information and clarity of understanding (*entendimiento*) are deposited'. As an ark, books kept treasuries of knowledge – much of it spiritually sanctioned. Venegas also wrote of the 'Archetype

23. Chartier (1994, 5) recalls this act when he speaks of the mystical relationship with the book as one in which discrete moments of reading are sequential and the physical book becomes an externalised form of a highly personal, subjective experience. The act is pleasurable and joyful, and the physical reaction to the 'manducation' of the text leaves its mark on the body.

24. Vellum was produced by soaking skins in lime to loosen the fat and fur, then scraped or pared over a frame to ultimate thinness. The skins were punctured to give guidelines for ruling and occasionally rubbed with chalk.

Book' – the exemplar to be read only by angels – and the 'Metagraph Book' – to be read by humans. He continued the popular view that the book was the 'expression of the divine world and container of all knowledge . . . God has expressed truth in book of nature and holy book – these are translated to characters which allow human books to communicate with God' (in Mignolo 2000, 351). This is the legacy of the Christian book – an intercession between spiritual and human realms, interpreting God's work.

The translation of the Bible was a transcription of God's Word and similarly the museum represented an evocation of God's work. The entirety of collections was extremely significant, both within books of natural history, the taxonomic systematics of Linnaeus and the museum. In order to be true to God's creation, the museum needed to show all species that God had created, and the best exemplars of each specimen. Nature was seen as the book written by God, and to know nature was to know God. As such, the form of the book – sequential and binary – was to conform to a divinely sanctioned construction of nature, which was progressive and defined by difference.

Prior to the availability of books, cathedrals and churches stood as Bibles, telling the story to the illiterate through their masonry and windows. As printing developed, emphasis lay in the authority of texts. In a reversal of this, printed texts of natural history existed long before museums – the cathedrals of nature. Physical spaces were thus responsive to an existing textual directive. As I have discussed, the movement to book as binary form – recto and verso – coincided with the age of Christianity, whereas the contemporary book in digital form has reverted to the scroll with no expectation of pairing, binary or dualistic format. Sections of text are viewed independently, but are part of a continuum and perhaps, in this way, are of the post-Christian age. The return to the scroll and a continuum of knowledge is closely related to the fluidity of speciation and the reimagining of the iconography of evolution as a rhizomatic web. The decline of the dominant codex and its rectilinear format may free the museum from the stranglehold that information in sequential, hierarchical form has had on it.

