Introduction

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Worlds of history

Natural history, conceived broadly to cover all quests for systematic understanding of natural objects – plants, animals and minerals – is vast in scope, both temporal and global. In the West, for example, it reaches back at least to the works of Aristotle and Theophrastus in the fourth and third centuries BCE, and the Chinese tradition is of comparable antiquity.[1] The organised discipline which emerged in Renaissance Europe, while drawing upon these various traditions, took on its own identity through a corpus of texts, characteristic sites of practice and specific textual and iconic traditions. This discipline is the point of origin of *Worlds of Natural History*. Admittedly, it is sometimes seen as having been progressively displaced over the past couple of centuries by fields seen to be more rigorously scientific. But on this score the behaviour of natural history has been reminiscent of that of the old man in *Monty Python and the Holy Grail*, who, about to be cast onto a wagon of corpses, declares: 'I'm not dead'. Contrary to our millennial anxieties, natural history has flourished in recent decades, with ever-increasing funding, media presence and public engagement.[2]

Throughout the period covered by this volume the practices of natural history have been entangled with other enterprises, some extensive – agriculture, commerce, exploration, cross-cultural encounters – some more local – horticulture, hunting, museum display, pursuit of hobbies, gastronomy, and so forth. Accordingly, the history of natural history is closely engaged with many other important and intriguing branches of history. *Worlds of Natural History* celebrates this prospering of natural history itself and its history.

Five hundred years of natural history

Over the past 500 years the practices, theories and institutions of natural history have undergone radical changes; and the past 50 years have seen much innovation in the agendas and methods of its historians. Nevertheless, the history of natural history remains,

we believe, a coherent enterprise. Certain shared practices, spaces, traditions and trends run through all the sections of the volume. Among these, material culture looms large, for what characterises much of natural historical endeavour from the Renaissance onwards is the collection, arrangement and representation of natural objects. Most of the chapters in this book concern themselves in one way or another with these practices. Debates over preservation (Felfe, Findlen, Anne Secord, Toledano), over fieldwork or museum practice (Alberti, Benson, Curry), over imagery (Jorink, Kusukawa, Nickelsen, Richards), and over description and grouping (Endersby, Müller-Wille) are parts of a larger debate over collecting and ordering. These practices are more specific to natural history as a discipline than, for example, networking (a practice common to learned communities generally), and more fundamental than, say, the use of collections for the advancement of political or imperial agendas (a practice not necessarily shared by private collections). At the same time, collecting and ordering, preservation and provenance, curiosity and taste, are priorities which natural history has in common with the fine arts.

These preoccupations with the material were not abandoned with the rise of experimentation, nor with the spread of natural history to parts of the world distant from Europe, as the chapters of Terrall and Lee show. It might be possible to identify distinct regimes of natural historical practice: the sixteenth- and seventeenth-century world of princes and polymaths addressed by Egmond, Jorink and Kusukawa appears quite different from the commercial and colonial regime of the later eighteenth century to be found in the chapters of Bleichmar and Plumb; the institutional and public pursuit of nineteenth-century natural history described by Anderson and Nyhart took on a new form with the twentieth-century emphasis on conservation and curation characterising the chapters of Curry and Duarte. These shifts correspond to wholesale changes in the structure and form of the institutions of natural history, as well as in the relationship between learning and power, whether scholarly or governmental. Sweeping transformations such as the emergence of publics, states, the modern university system, the rise of laboratory and field science and the modern environmental movement have all produced new modes of practising natural history.

In saying this we do not seek to imply that the history of natural history can be understood in terms of separate epistemes, paradigms, stages or programmes. Rather, certain themes have borne more fruit for some historical periods than for others. Epistolary networks have emerged as a central focus of the history of the discipline between

about 1500 and 1750, while books and paper tools – addressed in this volume by Müller-Wille – have received little attention for the period after 1850. It is only after 1750 that institutions, understood as impersonal spaces within which funded natural historical research could proceed, assume pre-eminence as scenes of enquiry, concurrently with the emergence and diversification of natural historical publics. Yet the basis for the practice of natural history has remained stable: *naturalia* and their representations. Alongside materiality and order, a third enduring criterion, spatiality, might also be seen as characteristic of all natural historical practice, from the national zoos described by Ash to Felfe's account of depicted collections as arguments about order and hierarchy in the natural world.

Several chapters call into question, at least by implication, grand narratives that invoke radical upheavals: the Scientific Revolution; epistemological ruptures (Gaston Bachelard); paradigm shifts (Thomas Kuhn); succession of epistemes (Michel Foucault).[3] The notion of a 'Scientific Revolution' rejecting the authority of the ancients in favour of the testimony of direct observation and experiment does not fit well with Ogilvie's chapter; the Foucaultian leap from a pre-classical episteme of analogies and sympathies to a classical episteme of dispassionate ordering is at odds with the persistence of emblematic and moralising views of *naturalia* noted by Lawrence; many of the later chapters militate against the supposed nineteenth-century displacement of timeless natural historical ordering based on surface characteristics by a modern biological episteme of inwardness and temporal innovation; and Sivasundaram and others challenge the global modernisation of the worlds of natural history. The overall picture that emerges is one of institutional, cultural and national diversity in the development of natural history, a pattern that often shows what Ernst Bloch called 'the non-contemporaneity of the contemporaneous', that is the contemporaneity of past practices and views that seem from our present standpoint as if from different eras.[4] Thus, we have displays by charlatans of wonders and curiosities at the Royal Society at the very time that many of its members were promoting an experimental-philosophical approach to freaks and abnormalities; elaborate codes of moral and sentimental meanings for flowers alongside the nineteenth-century incorporation of many areas of natural history into the new alliance of disciplines called 'science'; and today we see, despite challenges from the botanists, the continued use of Linnaean Latin nomenclature and species descriptions in an age of gene sequencing and cladistic taxonomy.[5]

Trends and turns

When writing our introduction to *Cultures of Natural History* (1996), the precursor to the present work, we inhabited a very different historiographical world.[6] The new cultural history represented historians' embrace of what were being dubbed the 'anthropological turn' and the 'linguistic turn'.[7] In earlier decades, the word 'culture' had generally been used by historians for such elite subjects as canonical literature, classical music or fine art. In its new, anthropological sense, the term was aptly defined by Raymond Williams in *Keywords* as any community sharing a set of significances, whether linguistic, visual or corporeal.[8] Many historians had taken up the implications of this anthropological borrowing to rewrite history in terms of communities, their discourses and their communications. Aspects of this approach, well represented in both *Cultures of Natural History* and the present volume, include 'defamiliarisation' and 'decentring': defamiliarisation being interpretation founded on recognition of the cultural distance of past activities and conceptions from our own, rather than assimilation to present standards and ideas; decentring being the move away from concentration on central and iconic discoverers, authors, texts and settings of the sciences towards critical examination of the full range of their agents, points of view and sites of inquiry. Such decentring is evident throughout this volume, which covers a remarkable range of contributors to natural history: physicians and theologians (Kusukawa); apothecaries and their assistants (Pugliano); informal networks of gardeners (Knight); collectors and dealers (Egmond, Findlen, Lawrence, Pugliano, Toledano); philosophers (Jorink); networks of correspondents (Egmond, Müller-Wille); bureaucrats and entrepreneurs (Müller-Wille); sellers and merchants (Plumb); engravers, draughtsmen, publishers (Nickelsen); morphologists, palaeontologists, ecologists and taxidermists (Alberti); spectators (Alberti, Qureshi); indigenous communities (Curry, Duarte, Montero, Qureshi, Radin, Sivasundaram); anthropologists (Radin); publics (Anderson, Ash, Knight, Nyhart, Plumb, Richards).

The cultural turn of the 1980s and 1990s yielded new accounts of the history of the book which acknowledged the complexity of composition and production, rather than taking texts as direct expressions of authorial intention, and which viewed reception in terms of communities of readers who actively constructed and appropriated, rather than passively receiving, the meaning of texts.[9] At the same time, attention was directed to the modes of communication, persuasion and instruction, both textual and visual, in the sciences.[10] This is of great importance for sound interpretation of past works, given the diversity and (to us) often alien natures of textual and visual

conventions prior to more recent standardisation of presentation and illustration in articles, treatises and textbooks. Of special interest in this connection are recent studies, including the contributions of Knight, Ogilvie and James Secord, that have looked into the descriptive and persuasive devices of natural history writing and its relations to such genres as travel and science fiction writing, epic and myth.[11]

The impacts of further 'turns' – the material turn and the spatial turn – are much in evidence in this volume. The material turn had its origins in archaeology and anthropology, and in histories of arts, crafts and everyday life.[12] In the history of science, this turn has led to increased attention to artisanal and day-to-day activities, and to the complex interactions of people, materials, tools and machines in the production and communication of knowledge.[13] Closely associated with this material turn has been the spatial turn, moving from diachronic narratives to synchronic exploration of the pursuit and communication of the sciences in and between diverse sites and settings.[14] Common to both of these turns is the recognition of the hybridity of pursuit of the sciences and the inseparability of cognitive, social, economic (and often commercial and political) activities in the production, consolidation and communication of scientific knowledge.[15]

Especially in the history of natural history, there has been extensive recent study of the intimate links between global communication and exchange of knowledge on the one hand, and exploration, empire and commerce on the other. Here, two domains of research which have sprung into life since 1996 are worth mentioning. Atlantic and Iberian Empire studies, here represented in the chapters of Bleichmar, Ogborn and Rebok, have given rise to a rich body of work uniting the histories of imperialism, colonialism and environment.[16] Works that recognise the dependency of natural history on indigenous sources and informants have taken seriously the standpoints of non-European practitioners and the central role of indigenous knowledge in the formation of European natural history, and this trend is represented by the chapters of Duarte, Montero, Qureshi, Radin and Sivasundaram.[17] A further development, exemplified in the chapters of Egmond, Knight and Müller-Wille, is the greatly increased attention to networks as a model of natural historical practice, in which natural history figures as a collective enterprise, in sharp contrast to earlier emphases on individual naturalists or institutions.

The development of the historiography of the sciences, including natural history, is often presented as a tale of progress through successive 'isms' and progressive 'turns'.[18] Accordingly, positivistic accounts of the accumulation of 'positive' scientific knowledge are said to have been displaced through a turn from internalist to externalist, practice-oriented studies. The practice-oriented sociology of scientific knowledge (SSK) of the 1970s and 1980s, focused on the

ways in which social interests have shaped the local construction of scientific knowledge, is seen as being displaced in the late 1980s and 1990s by the exploration of networks of communication and mediation between the agents (both human and non-human) involved in the consolidation of scientific knowledge. This formed a part of what in the mid 1990s many (including ourselves as authors of the introduction to *Cultures*) perceived as a more general cultural turn, characterised, as noted above, by a new historicist sensitivity to the foreignness of past sciences, by recognition of the complexities of the production and reception of their texts, and by 'decentring' the move towards recognition of the full range of participants, sites and tools of the sciences.

Where much of this new cultural history was microhistorical, local both in time and space, the dawn of the new century is widely perceived as marked by a 'global turn' towards macrohistories, extensive not temporally but spatially, concerned with worldwide communication, translation, and cross-cultural interaction in the sciences. As for the present, study of the sciences is enjoying a new incursion from anthropology, the so-called 'ontological turn'. Here what is advocated is not a focus on foundational categories and perspectives on nature, but rather on the things recognised, formed and valued by local communities, their worlds, as evident in their declarations and implicated in their practices.[19] Further, there are many who see all fields of history as strengthened in objectivity and enlarged in temporal and spatial scope through automated linkage and analysis of 'big data'.

There are several objections to conceiving the development of the historiography of the sciences as a series of 'turns'. It can lead to exaggeration, inflating (in the words of Frank Kermode) 'adjustments of normal practice' into 'shocking paradigm shifts'.[20] Further, the antitheses presented in such accounts are potentially misleading. Consider the microhistory vs macrohistory division. Original and constructive works relating to the history of natural history have cut across this division, producing culturally extensive 'middle-sized' histories by working outwards from some single item, exploring the full range of activities and interpretations involved in its production, reception and appropriation: notable examples are Anke te Heesen's *The World in a Box* (2002) and James Secord's *Victorian Sensation* (2000).[21]

The view of historiographical progress through 'turns' also misleads by concealing the rich variety of past approaches. To take a couple of examples from the historiography of natural history, consider two productions from the positivist era: Karl Friedrich Wilhelm Jessen's *Botanik der Gegenwart und Vorzeit in culturhistorischer Entwickelung* ('Botany of the Present and Past in its Historico-Cultural Development', 1864) and Henri Daudin's volumes *De Linné à Lamarck* and *Cuvier et Lamarck* (1926–7). In Jessen's work, we find

close attention to the social and institutional settings of natural history and to its links with exploration and commerce; and in Daudin's volumes, past systems of ordering and classification are carefully related to the collecting, horticultural and curatorial activities of the naturalists.

The vision of successive turns is liable to distort not only our perception of the development of the historiography of natural history, but also our practice as its historians. Overcommitment to the latest 'turn' may also lead to accounts that commit anachronism and/or anatropism (that is, misleading application of our categories to cultures other than our own). Thus, while a 'centre of calculation' model has proven useful to describe the operation of certain centralised natural historical networks in the colonial era, it obviously cannot account for all of natural historical practice. For example, work on eighteenth-century Spanish central accumulation of reports, images and specimens gathered by botanical expeditions to colonised territories, and on the co-construction of natural historical knowledge between learned South Asians and Europeans from the seventeenth to nineteenth centuries, fits poorly with a centre and periphery model.[22]

New approaches and methodologies have enriched and diversified the history of natural history; yet, as editors, we hope that they do not consign older themes, such as institutions, systematics, order and the moral or medicinal purposes of collecting, to oblivion. Any foreclosure of alternative viewpoints and approaches, a commitment to external *rather than* internal, global *rather than* local, etc., is genuinely damaging to the historiography of the sciences.[23] Moreover, commitment to new turns, -isms or paradigms has on occasion had a further deleterious effect, leading not to the effective application of new interpretative and explanatory models, but to the spicing up of narratives with buzz words. A formulaic adherence to the language rather than the spirit of such innovations yields results like those described by Grandpa Vanderhof in Frank Capra's romantic comedy *You Can't Take It with You*, when he declares 'When things go a little bad nowadays, you go out, get yourself an -ism and you're in business.'

Controversy over 'turns' can, however, prove fruitful: consider, for example, the reflections on modes of communication in the sciences incited by Bruno Latour's conception of printed works as 'immutable mobiles'. Moreover, fashionable turns may stimulate valuable backlashes, for example, the revival of aspects of the 'history of ideas' in the 'new historical epistemology', of which a splendid example – with much relevance for the history of natural history – is Lorraine Daston and Peter Galison's *Objectivity* (2007).

Moreover, caution is in order in challenging the vision of progressive turns in the historiography of the sciences. For it is all too easy to slip from 'let a hundred flowers bloom' to 'anything goes', an unfortunate slippage,

given that there are aspects of formerly and currently favoured approaches that surely do deserve criticism and displacement. For example, while such positivistic accounts of cumulative natural historical progress as Julius von Sachs's *Geschichte der Botanik* ('History of Botany', 1875) and Karl Alfred von Zittel's *Geschichte der Geologie and Paläontologie* ('History of Geology and Palaeontology', 1899) remain mines of useful information, their anachronisms and nationalistic bias in selection and interpretation are to be avoided. And, leaping forward to currently fashionable global studies, these should beware of exclusive focus on worldwide transactions at the cost of inattention to local practices, local worlds and local patterns of communication.

To question the notion of linear progress through successive turns is by no means to deny that recent developments in the cultural history of the sciences have greatly enriched the discipline. With a few exceptions, manifest, for example, in the natural historical works of Jessen and Daudin mentioned above, the history of science long remained an isolated discipline, a peripheral didactic adjunct to the sciences and little involved with other branches of professional history. But the past thirty or so years have seen a major shift, with greatly increased engagement with mainstream history, as is abundantly evident from the proliferation of studies that link the history of natural history to the histories of agriculture, exploration, commerce, politics, art and collecting, and public entertainment. *Worlds of Natural History* bears witness to this new diversity in its four Parts, devoted respectively to 'Early modern ventures' – the Renaissance world of exploration and enterprise; 'Enlightened orders' – the systematising projects of the long eighteenth century; 'Publics and empires' – the imperial world of Victorian natural history; and 'Connecting and conserving' – natural history's very recent past.

Where next?

To wind up this Introduction we offer, in the light of our pleasant experience as readers of the chapters of this volume, some predictions and recommendations.

Let us start with safe predictions. In line with the current ontological turn, we envisage much further study of the skills and ways of life associated with naturalists' interactions with the specimens and equipment of natural history. We further foresee the continuation of profitable engagements between the history of natural history and the histories of exploration, commerce and empire. Further linkages that hold great promise include: art-historical study of geological, botanical and zoological illustrations; study of the ties between the practices of natural history, local history and antiquarianism; links between

natural history and the changing interactions of humans with other animals; exploration of the connections between the history of the environment and the development of natural history. Given that the pursuit of natural history has been coeval with the transformation of the Earth through agriculture, deforestation and climate change, the latter seems an especially fruitful field.

Equally safe is the prediction that 'big data' collection, linkage and analysis hold immense potential for the history of natural history.[24] Caution is, however, in order: scientistic declarations on the capacity of big data analysis to render history an objective science are to be resisted; and due reflection is needed on the ways in which the traditional skills of close scrutiny and interpretation of sources, both textual and visual, may be effectively combined with generalisation through big data analysis.[25] But there can be little doubt that the history of natural history will profit greatly from big data collaborative enterprises in the fields of communication and reception, of commerce, and of agriculture and environmental change.

More tentatively, we suggest that there may be a resurgence of temporally extended 'big picture' accounts. Helpful though big data analyses will be for such accounts, they pose serious problems of narrative structuring. Despite their narrative convenience, triumphal stories of natural historical progress are subject to well-known objections, as are dramatic tales of successive epochs, epistemes, research programmes, and paradigms. More promising are thematically based long-duration narratives, covering, to take just a couple of examples: the grounding of natural historical practices in notions of objectivity, as in Daston and Galison's *Objectivity*; and the shaping of natural historical discourse by dominant metaphors, as in Donna Haraway's *Crystals, Fabrics and Fields* (1976).[26] To be hoped for too is more extensive re-engagement with the content of past natural histories. Here we have in mind not so much rehearsals of past discoveries and theories, as in traditional didactic and positivistic histories, but rather accounts of the changing priorities and bones of contention among natural historians. Such studies would explore the ways in which new agendas have transformed the practices of natural history, and how new practices have, in turn, transformed old agendas and created new ones.[27]

Yet more ambitiously, we may hope for big pictures that will relate the changing practices, agendas and forms of communication and education in natural history to changes in power structures and relations. Here we have in mind not the Eurocentric regimes and epistemes of Foucault and his devotees, but rather the powers exerted through exchanges of goods, technologies, forms of governance and ideologies. There is, indeed, literature on which such big pictures may draw: for the early modern period, relating natural history to