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**Colonizing Science: Nature and
Nations in the Spanish World,
c.1750-1850**

By

Helen Louise Cowie (M.A.)

**A thesis submitted in partial fulfilment of the requirements
for the degree of Doctor of Philosophy in History**

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Declaration

This thesis is entirely my own work and has not been submitted at any institution as part of another academic qualification.

Abstract

This thesis examines the development of natural history in the Spanish Empire (1750-1850). I explore why the Spanish Crown promoted scientific institutions and expeditions in the second half of the eighteenth century, and I situate Spanish engagement with natural history within an imperial context. One Spanish commentator, scrutinising the contents of the Real Gabinete de Historia Natural in 1788, gloried that ‘we have seen form this immense collection of singularities of nature, brought at considerable expense, not only from all regions of Europe, but also from Asia, Africa and America; so that all parts of the world may contribute to forming the most complete treasure of Natural History that exists in the Universe’. I suggest that Spain’s capacity to procure and exhibit exotic natural treasures reflected the potency of her imperial structures. I also address the social, religious and economic benefits associated with the classification, collection and cultivation of natural objects.

I am especially interested in the part that Spanish Americans played in this process, and the ways in which the development of the natural sciences on the imperial periphery intersected with the evolution of creole patriotism in the late colonial period. I consider how the creation, legitimisation and dissemination of scientific knowledge reflected broader questions of imperial power and national identity. I examine the ambiguous position of creole naturalists, who were simultaneously anxious to secure European recognition for their work, to celebrate the natural wealth of their homelands and, in some cases, to vindicate local forms of knowledge against purportedly universal European systems such as Linnaean botany, and I extend this analysis beyond independence, asking whether political freedom fomented or compromised the pursuit of natural history in the former colonies.

Introduction

In February 1773, the frigate *Venus* departed the port of Manila in the Philippines with an exotic, unconventional and rather demanding item of cargo. The Nabob of Indonesia had recently bestowed a young male elephant upon the Spanish Governor of the Philippines, Don Simón de Anda y Salazar, as a token of gratitude for services rendered. The *Venus*' crew was entrusted with conveying this precious pachyderm to Don Simón's royal master in Madrid. It was ably assisted in this endeavour by the 'young Malabar' who had raised the animal, and who was charged with its care whilst in transit.

When the elephant boarded the *Venus* it was only an infant, yet it exhibited a voracious appetite. Over the course of the voyage, the animal devoured a daily ration of twenty-four pounds of rice, six pounds of sugar, two and a half portions of bread and four bananas. It quaffed eighty-five quartillos of water and two rations of wine, and it was dosed at regular intervals with a special medicine, concocted from a blend of thirty-two different spices and washed down with a liberal draught of rum. Thanks to – or perhaps in spite of – this delectable diet, the elephant survived the six-month voyage to Spain, and disembarked alive at the Andalusian port of Cádiz on 22 July.¹ From here it was taken to Real Sitio de Aranjuez, where it resided for six years. It was then transferred to the Real Sitio de Idelfonso, near Madrid.²

¹ 'Noticia del Elefante remitido de Manila para el Rey nuestro Señor en la Fragata nombrada Venus, que regresó de Philipinas en 22 de Julio de este año, según una Papeleta remitida de Cádiz', in *Descripción del Elefante, de su Alimento, Costumbres, Enemigos e Instinto y Explicación del Uso que se Hace de los Elefantes, Modo de Cazarlos y Utilidades de sus Colmillos en la Medicina y en los Artes etc.*, Madrid, Imprenta de Andrés Ramírez, 1773, p.31

² Juan Bautista Bru de Ramón, *Colección de laminas que representan los animales y monstruos del Real Gabinete de Historia Natural* (2 vols.), Madrid, Imprenta de Andres de Sotos, 1784-1786, p.40

Charles III's Indonesian elephant appears to have generated considerable attention in its adopted homeland, enchanting both the King and the wider Spanish public. A short pamphlet published to celebrate the creature's arrival in 1773 complimented the elephant on its plentiful array of tricks, which included the ability 'to bow, and to collect from the ground with its trunk any gold or silver coins and deliver them to [its Indian trainer]'.³ The naturalist Juan Mieg, meanwhile, writing several decades later, reported that 'many older people have seen [this elephant] walk through the streets of Madrid during the reign of Charles III, and can tell you many anecdotes about it'.⁴

Sadly the elephant expired at a relatively young age. Its premature demise did not, however, signal the end of its celebrity, for its stuffed torso was promptly installed in the newly founded Real Gabinete de Historia Natural in Madrid. The *Memorial Literario, Instructivo y Curioso de la Corte de Madrid* announced in February 1784 that the elephant and its skeleton were now on public view in the Sala Botánica, constituting, 'two pieces worthy of much admiration, arranged and prepared by the Painter and Dissector of this Real Gabinete, D. Juan Bautista Bru'.⁵ Mieg also devoted some twenty pages to the creature in his 1818 guide to the Museum, contemplating the animal's physical and moral qualities and adducing its dexterous trunk as evidence of 'the wisdom of the Creator'. The elephant's cadaver remains on display today at Madrid's

³ 'Noticia del Elefante', p.31

⁴ Juan Mieg, *Paseo por el Gabinete de Historia Natural de Madrid, o descripción sucinta de los principales objetos de zoología que ofrecen las salas de esta interesante colección*, Madrid, Imprenta de D.M. de Burgos, 1818, p.464

⁵ *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, February 1784, Madrid, Imprenta Real, 1784, p.19. There was no room for the animal in the more appropriate Sala de Mamíferos.

Museo Nacional de Ciencias Naturales, where it continues to fascinate modern-day museum visitors.

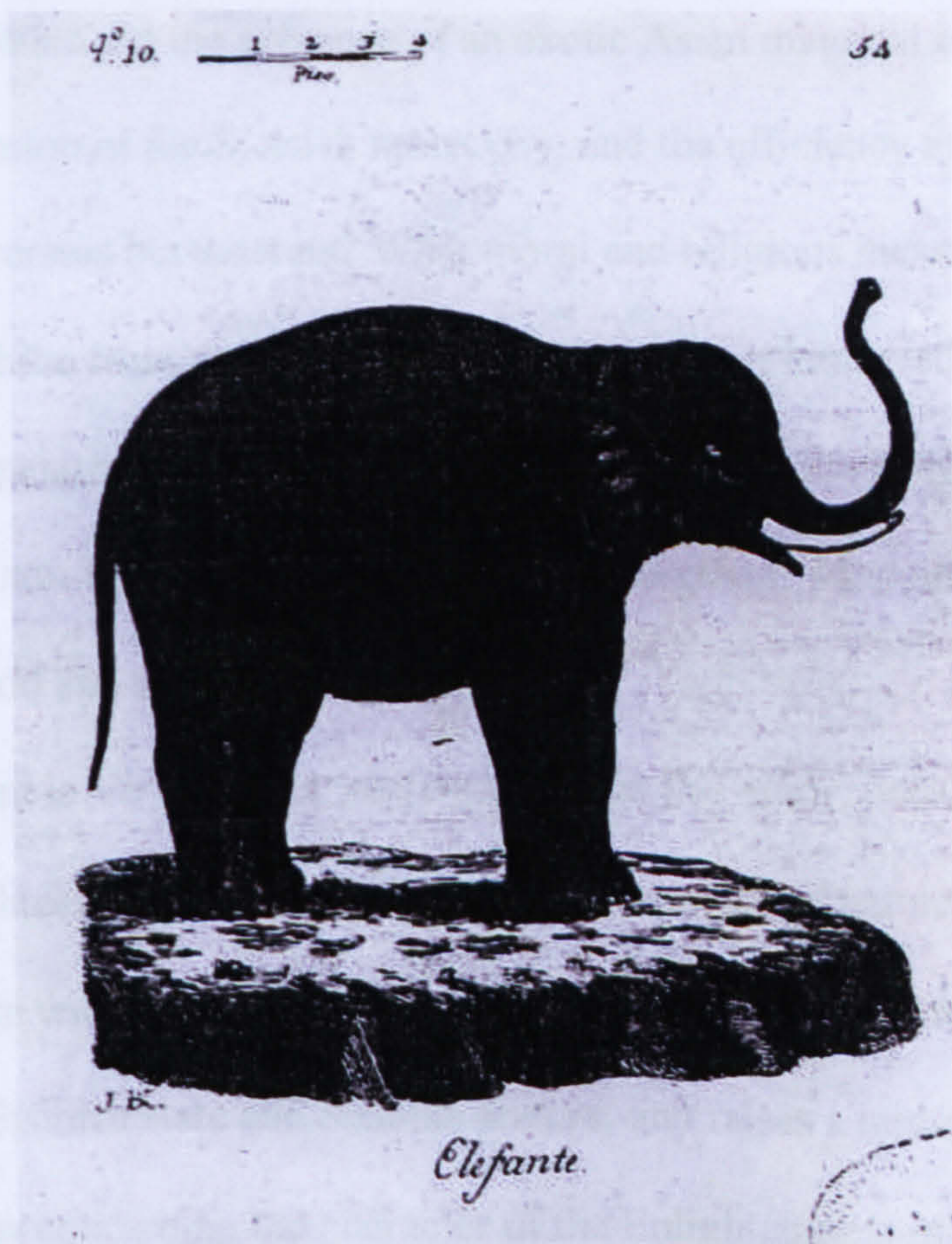


Fig.1: The elephant from the Real Gabinete, as depicted by Juan Bautista Bru in *Colección de Láminas que representan los animales y monstruos del Real Gabinete de Historia Natural de Madrid*, Madrid, 1786, p.37



Fig.2: The elephant, Museo Nacional de Ciencias Naturales, Madrid, Personal photograph.

The eventful career of Charles III's elephant offers an intriguing glimpse into the development of the natural sciences in late eighteenth-century Spain. It also poses some interesting questions. What, after all, did the Spanish King want with an elephant? What did the presence of an exotic Asian mammal in Madrid say about the extension of the Spanish monarchy, and the efficiency and obedience of its overseas bureaucrats? What moral and religious messages could contemporaries imbibe from the elephant's living body, as it lumbered through the streets of the Spanish capital, or from its stuffed corpse in the Real Gabinete? And what role did non-European people, such as the elephant's Indian keeper, play in the collection and study of natural objects?

The elephant is a convenient starting-point for this study, because it symbolises the eighteenth-century interest in the phenomena of nature and the growing fascination with 'natural philosophy'. It also reflects Enlightenment influences on the Spanish state and Spanish culture, and raises a number of important questions concerning the character of the Enlightenment in the Spanish world. There has been a tendency in European historiography to neglect the influences of Enlightenment in Spain, despite the pioneering works of Richard Herr and Jean Sarrailh.⁶ In recent years, however, scholars have begun to offer fresh approaches to understanding cultural developments and their relationships to power both in Spain and the wider Hispanic world of Spain's American dominions.⁷ The historiography on the Enlightenment in Spanish America has been particularly fertile in new approaches. One development has been to shift

⁶ See Richard Herr, Richard, *The Eighteenth-century Revolution in Spain*, Princeton University Press, 1958 and Jean Sarrailh, Jean *La España Ilustrada del a segunda mitad del siglo XVIII*, Mexico-Buenos Aires, Fondo de Cultura Económica, 1957

⁷ A notable contributor has been David Brading. See, David A. Brading, *The First America: The Spanish monarchy, Creole patriots and the Liberal state 1492-1867*, Cambridge, Cambridge University Press, 1991

the focus away from the identification of ‘Ilustración’ and ‘ilustrados’ with the political ideas of the French Revolution and, by extension, with ideas about political independence from Spain that surfaced in the 1790s and early 1800s.⁸ Recent studies have veered away from any simple identification of ‘science’ and ‘sedition’, identifying with greater clarity the new ways of thinking that entered the Spanish world and showing how they might be used both to bolster the existing political order and to criticise it.⁹

Within the wider ambit of Enlightenment studies, there has also been a notable shift, relevant to this thesis, towards closer study of the relationship between ‘science’ and imperialism, in a period when fresh explorations expanded European knowledge and control of territories previously unknown to Europeans. Dorinda Outram contends that ‘colonialism, the exotic and the exploitation of nature were inextricably linked in the eighteenth century, and provide verification for the contention the Enlightenment and the control of nature were part of the same project’.¹⁰ Richard Drayton perceives the expansion of Kew Gardens in London as handmaiden to Britain’s imperial glory,¹¹ whilst Mary Louise Pratt construes eighteenth-century botanical expeditions as a variant of

⁸ Anthony McFarlane summarises this trend, demonstrating how ‘in [New Granada], Enlightenment – primarily understood as the study of science – was less a trigger to political emancipation from Spanish rule (as it has often been seen) than a force for cultural change within the existing order’. See Anthony McFarlane, Anthony, ‘Science and Sedition in Bourbon South America’, in Manning, Susan and France, Peter (eds.), *Enlightenment and Emancipation*, Lewisburg, Bucknell University Press, 2006, pp.97-117

⁹ See, for example, Jorge Cañizares-Esguerra, *How to Write a History of the New World: Histories, Epistemologies and Identities in the Eighteenth-Century Atlantic World*, Stanford, Stanford University Press, 2001; Mauricio Nieto Olarte, *Orden Natural y Orden Social: Ciencia y Política en el Semanario del Nuevo Reino de Granada*, Madrid, C.S.I.C, 2007; and Renan Silva, *Los Ilustrados de Nueva Granada, 1760-1808: Genealogía de una Comunidad de Interpretación*, Medellín, Fondo Editorial Universidad LATIT, Banco de la República, 2002

¹⁰ Dorinda Outram, *The Enlightenment*, Cambridge, Cambridge University Press, 1995, p.63

¹¹ Richard Drayton, *Nature’s Government: Science, Imperial Britain and the ‘Improvement’ of the World*, New Haven and London, Yale University Press, 2000

cultural imperialism, in which the apparently ‘benign’ figure of the naturalist acted as a vehicle for colonial power.¹² The study of eighteenth-century ‘science’ has, moreover, widened our appreciation of the character and development of scientific practice. ‘Science’ was not a term used in the eighteenth century but rather ‘natural philosophy’ – which focused on the study of nature and the external world through direct observation and the rational, causal interpretation of empirical data. In this thesis, I am concerned with the development of such ‘science’ in the Hispanic world.

My enquiry is framed by the belief that study of ‘science’ in the Hispanic world, as elsewhere, must address the ways in which different spaces and places shape scientific knowledge. David Livingstone has argued that science, though often perceived as a uniform entity whose assumptions and methods are everywhere identical, is in fact ‘a human enterprise, situated in time and space’.¹³ The thesis considers, accordingly, how location mediated the study of natural history in Spain and its empire. It explores scientific practice in a range of different places – from the metropolitan natural history cabinet and botanical garden to the Andean sierra and the Amazonian jungle – and it discusses the advantages and constraints offered by different spaces.

One issue of particular interest is the relationship between place and scientific credibility. How did the geographical situation of a naturalist condition the scope of his investigations and the trustworthiness of his findings? Did

¹² Mary Louise Pratt, *Imperial Eyes: Travel Writing and Transculturation*, London, Routledge, 1992. For additional analysis of the relationship between science and empire, see also Emma Spary, *Utopia’s Garden: French Natural History from Old Regime to Revolution*, Chicago and London, University of Chicago Press, 2000; and Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World*, Cambridge Massachusetts, and London, Harvard University Press, 2004

¹³ David Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge*, Chicago and London, University of Chicago Press, 2003, p.13

different physical spaces engender different truth claims? What were the respective advantages and limitations of working in the museum or in the field? And did naturalists operating in the heart of the Spanish empire conceptualise science differently from their counterparts in the imperial extremities?

Various authors have addressed these questions in other European contexts, and the thesis considers how these concerns manifested themselves in the Hispanic world.¹⁴ It documents the epistemological tensions between the exotic and the native, the universal and the local, erudition and experience. It argues that different places generated rival credibility strategies, and it suggests that the pertinence and validity of scientific knowledge depended to a considerable degree upon the physical conditions in which it was produced. The Spanish amateur zoologist Félix de Azara, for example, savoured the benefits of direct observation, proclaiming that his sustained contact with Paraguayan animals made him less prone to anatomical blunders than ‘those who have seen them enfeebled, bald and dirty in cages and chains’ or those ‘who have searched for them in cabinets, where, in spite of the greatest care, the ravages of time cannot fail to have greatly altered their colours...and where not even the best prepared skin or skeleton can give a precise idea of their forms and measurements’.¹⁵ The Mexican savant José Antonio Alzate y Ramírez, meanwhile, judged a locally written medical text to be of more practical use to his compatriots than European works such as those of the esteemed physician

¹⁴ See, for example, Dorinda Outram, ‘New Spaces in Natural History’, in Jardine, Secord and Spary, *Cultures of Natural History*, pp.249-265; Alix Cooper, *Inventing the Indigenous: Local Knowledge and Natural History in Early Modern Europe*, Cambridge, Cambridge University Press, 2007; and Krzysztof Pomian, *Collectors and Curiosities, Paris and Venice, 1500-1800*, Cambridge, Polity Press, 1990. Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World*, Cambridge Massachusetts, and London, Harvard University Press, 2004

¹⁵ Félix de Azara, *Apuntamientos para la Historia Natural de los Quadrúpedos del Paraguay y Río de la Plata*, Madrid, la Imprenta de la Viuda de Ibarra, 1802, Vol. I, p.2

Tissot, since 'it has the advantage of having been conceived of in the Kingdom [of New Spain], tested in it and [compiled from] simples known in it and which it produces'.¹⁶ Both of these authors perceived place to be integral to the construction of knowledge. They equated proximity with precision, and they trumpeted the value of local expertise over distant speculation.

Another theme that permeates the thesis is the complex relationship between natural history and national identity. Recent scholarship has emphasised the close connections between science and empire in eighteenth-century France and Britain. The thesis extends this analysis to Spain, which differed from its northern European rivals both in the magnitude and maturity of its imperial possessions and in the perceived backwardness of its scientific development, and it charts the Spanish Crown's efforts to map, classify and exploit the resources of its vast overseas dominions. Like Paula de Vos, whose work on natural history in Spain and America was published during the gestation of this thesis, I concentrate not merely on the government-sponsored botanical voyages, which dominate the existing historiography on the subject, but equally upon the less glamorous, but similarly important efforts to secure prized specimens via bureaucratic channels.¹⁷ I detail how enlightened Spaniards, anxious to restore

¹⁶ José Antonio Alzate, *Gazetas de México, Compendio de Noticias de Nueva España que comprehenden los años de 1788 y 1789*, Mexico City, Felipe de Zuñiga y Ontiveros, *Gazeta de Mexico del Martes 9 de Agosto de 1785*, Vol. I, p.370. The medical work in question was a text entitled 'Médicina Práctica'. Its author was Dr. D. Juan Manuel Venegas.

¹⁷ Paula De Vos, 'Natural History and the Pursuit of Empire in Eighteenth-Century Spain', *Eighteenth-Century Studies*, 2007, Vol.40 n° 2, pp.209-239. For more expedition-centred studies of eighteenth-century Spanish science see, for example, Arthur Steele, *Flowers for the King: The Expedition of Rulz and Pavón and the Flora of Peru*, Durham, Duke University Press, 1964; Juan Carlos Arias Divito, *Las Expediciones Científicas Españolas durante el siglo xviii: Expedición Botánica de Nueva España*, Madrid, Ediciones Cultural Hispánica, 1968; Francisco Javier Puerto Sarmiento, *La Ilusión Quebrada: Botánica, sanidad y política científica en la España Ilustrada*, Madrid, Consejo Superior de Investigaciones Científicas, 1988; Juan Pimental, *Jorge Juan, Mutis, Malaspina: Viajeros Científicos, Tres Grandes Expediciones al Nuevo Mundo*, Madrid, Novatores, 2001.

Spain's much maligned intellectual reputation, attempted to construct an impressive scientific heritage for their country, stretching back to the conquest of America and beyond, and I evaluate changing attitudes towards the sciences and their practitioners.

The thesis also studies the ambivalent position of Spanish American naturalists in this wider scientific project, highlighting differences between the metropolitan and colonial approaches to natural history. It suggests that the study of nature could fortify regional consciousness as well as imperial potency. It situates the exploration of the natural world within the broader literature on creole patriotism inaugurated by Antonello Gerbi in *The Dispute of the New World*, and developed in recent years by historians such as Jorge Cañizares-Esguerra, Mauricio Nieto, David Brading and Antonio Lafuente,¹⁸ and it explores how colonial savants such as the New Granadan Francisco José de Caldas or the Mexican José Antonio Alzate juggled both local and imperial loyalties. Gerbi contends, for instance, that the negative stereotypes of American nature disseminated by Buffon and other European savants galvanised patriotic sentiment, whilst Cañizares-Esguerra argues that American savants cultivated their own rival epistemologies to counter the claims of European science. The thesis suggests that natural history could serve, in different times and places, to parade imperial power, to foster regional pride and to forge national identities.

¹⁸ See, for example, Antonello Gerbi, *The Dispute of the New World*, Pittsburgh and London, University of Pittsburgh Press, 1973; José Peset, *Ciencia y Libertad: el papel del científico ante la independencia americana*, Madrid, CSIC, 1987; Brading, *The First America*; Antonio Lafuente, José de la Sota, José and Jaime Vilchis, 'Dinámica Imperial de la Ciencia: Los Contextos Metropolitano y Colonial en la Cultura Española del Siglo XVIII', in Agustín Guimerá (ed.), *El Reformismo Borbónico*, Madrid, CSIC, 1996; Cañizares-Esguerra, *How to Write a History of the New World*; Nieto Olarte, *Orden Natural y Orden Social*.

The thesis begins in mid-eighteenth-century Spain and moves on to assess the impact of the natural sciences in America. Chapter 1 asks why the Spanish Crown embraced the natural sciences in the latter half of the eighteenth century and situates interest in natural history within the broader climate of reform that characterised Bourbon Spain, particularly during the reign of Charles III. Chapter 2 considers the imperial dynamics of Spain's engagement with natural history, examining how the Spanish authorities collected specimens for the Real Jardín Botánico and the Real Gabinete de Historia Natural, whilst Chapter 3 moves beyond the acquisition of specimens to explore how these were viewed and interpreted, concentrating specifically on efforts to inculcate a taste for natural history in the wider Spanish public.

Chapters 4, 5 and 6 shift the focus across the Atlantic to examine the practice of natural history in Spain's American colonies. Chapter 4 enumerates the problems that afflicted naturalists working on the imperial periphery – lack of books, instruments, skilled technicians and a supportive scholarly community. Chapter 5 analyses the credibility strategies they adopted to compensate for these deprivations, whilst chapter 6 extends this analysis beyond independence, asking whether conditions for the naturalist improved after the end of colonial rule.

Chapter 7 addresses the professional profile of the naturalist. It explores the rhetorical techniques employed by men of science to enhance their social standing and their scientific credibility and it considers specifically the role of precision instruments, physical suffering and moral probity in the construction of the naturalist's professional identity. It also assesses how indigenous people, women and creoles measured up to these demanding criteria, thereby reprising a

central theme of this thesis – the uses of scientific research and knowledge as expressions of political power and new definitions of society and culture.

Chapter 1: Morals and Monuments

In 1768 a Moroccan traveller toured the Iberian Peninsula and cast a critical eye over Spanish culture and society. Gazel Ben-Aly, the fictional protagonist of José Cadalso's *Cartas Marruecas*, communicated his observations in a series of letters addressed to his compatriot Ben-Beley. His commentary formed part of a recognised literary genre, inaugurated by Montesquieu's *Lettres Persanes*, whereby the merits and defects of a country were presented to readers through the eyes of 'travellers native to Kingdoms that are not merely distant, but also opposed in religion, climate and government to the land they are visiting'.¹

Gazel Ben-Aly found much to criticise during the course of his travels. Among the many cultural flaws he exposed was 'the backwardness of the sciences in Spain in this century', which he ascribed to the 'lack of protection' accorded by society to scientific practitioners. 'There are coachmen in Madrid who earn 300 pesos', reflected Gazel, 'and cooks who found mayoralzgos; but there is nobody who does not know that he who devotes himself to the sciences must die of hunger'. Nor was it purely insufficient remuneration that stifled scientific activity in the Hispanic World, for in addition to their penury, those who deviated from traditional forms of learning aroused the derision of powerful opponents who scorned and ostracised them. Gazel sentimentalised the plight of these beleaguered savants, likening them to 'soldiers of fortune in armies, who receive no wage and expose themselves most', and he noted, with surprise, how they 'speak of mathematics, modern physics, natural history, the rights of man, antiquities and human letters, often with greater caution than if they were engaged in producing counterfeit money'. 'They live in obscurity', alleged the Moroccan, 'and they die as they lived, taken for superficial savants by

¹ José Cadalso, *Cartas Marruecas*, Madrid, Imprenta de Sancha, 1793, p.i

those who know how to concoct seventy-seven consecutive syllogisms about whether the skies are fluid or solid'.²

Nearly forty years after José Cadalso's fictional traveller lamented the situation of the scientific practitioner in Spain, another Iberian, Don Félix de Azara, posed for his portrait before Francisco de Goya y Lucientes, the nation's most sought after court painter. Azara had recently returned to the peninsula from America, where he had been sent by the Crown in 1781 to delineate the border between the Río de la Plata and Portuguese-owned Brazil. Stranded in this remote corner of the empire, the Spaniard, a soldier by profession, entertained himself by collecting and studying Paraguay's little known fauna, publishing several works on the region's birds and quadrupeds. 'I began to observe, buy, kill and describe the animals that I saw', explained Azara, 'in the hope that my notes might benefit natural history'.³

Goya synthesised both elements of Azara's multifaceted career in his 1805 portrait. The Spaniard's colourful military uniform, the cane he grasps in his left hand and the sword that dangles from his hip symbolise Azara's military credentials. The manuscript he clutches in his right hand and the books that rest on the desk behind him signify his status as a man of letters, whilst the contents of the shelves in the background indicate the direction of Azara's scholarly activities. Squeezed onto the two upper shelves, one can discern the slightly blurred silhouettes of stuffed birds; on the lowest shelf there lurk two larger beasts, one of which boasts distinctly feline contours. These curious objects identify Azara as an aficionado of natural history – specifically zoology.

² Ibid., p.18

³ Félix de Azara, *Apuntamientos para la Historia Natural de los Pájaros*, Buenos Aires, La Biblioteca Americana, 1940, Vol. I, p.1



Fig. 1: *Félix de Azara*, by Francisco de Goya y Lucientes, 1805

Goya's decision to showcase Azara's time-consuming sideline suggests that the Spaniard was proud of his extracurricular accomplishments and happy to advertise them. The artist could easily have silenced Azara's passion for natural history and concentrated exclusively on projecting his subject's noble roots and military valour, neither of which was inconsiderable – Don Félix was of unquestionably noble stock, his older brother Nicolas having served as ambassador to Rome and Paris, and he had acquitted himself admirably as a soldier, almost perishing in 1775 during an abortive assault on Algiers. That Goya elected, in spite of these facts, to depict Azara's achievements as a zoologist implies that his subject was proud of his learning and happy to publicise it. Both men must also have calculated that the portrayal of Azara's enthusiasm for nature would enhance his noble standing, or at least not in any way detract from it.

The two sources described above offer a strikingly different assessment of the perception of natural history in Bourbon Spain. Where Cadalso's Moroccan critic alleged that the man of science was disdained, marginalised and little appreciated, Goya's Azara radiates dignity and wisdom and confidently flaunts his proficiency as a naturalist, a striking contrast that suggests that attitudes towards the sciences had undergone something of a transformation. This transformation seems to have started during the reign of Charles III. It was reflected in the way in which men of science were rewarded and memorialised, and it may be seen as part of a broader raft of administrative, economic and cultural reforms instituted by the new Bourbon dynasty.⁴

This chapter explores what occasioned this change in attitude towards the natural sciences and studies some of its social, economic and cultural repercussions. It considers what prompted Spaniards – and particularly the Spanish Crown – to embrace the sciences. It emphasises the priority accorded to sciences with direct practical applications in the fields of agriculture, commerce and particularly, as Mauricio Nieto has demonstrated, medicine,⁵ and it examines how eighteenth-century Spaniards construed the resurgence of natural history in the Spanish empire not as a complete innovation, but rather as a continuation of an existing scientific tradition that had flourished with particular brilliance in the sixteenth century. Antonio Barrera has argued that the seventeenth-century Scientific Revolution 'started in the 1520s, in Spain when merchants, artisans and royal officials confronted new entities coming

⁴ Paula de Vos contends that the roots of Spain's mid-eighteenth-century engagement with the natural sciences can be traced back to the late seventeenth century and the reign of Charles II, when several key institutions were founded. The true flowering of these institutions occurred later, however. See Paul de Vos, 'Research, Development and Empire: State Support of Science in the Later Spanish Empire', *Colonial Latin American Review*, 15:1, 2006, p.61

⁵ Mauricio Nieto Olarte, *Remedios para el Imperio: Historia Natural y la Apropiación del Nuevo Mundo*, Bogotá, Instituto Colombiano de Antropología e Historia, 2000, p.148

from the New World and had to devise their own methods to collect information about those lands'; they could not rely upon classical texts for guidance, since 'there were no avocados in Pliny's pages'.⁶ Eighteenth-century commentators likewise looked back with fondness and pride upon the achievements of sixteenth-century savants. They also searched more broadly for suitable precursors, finding worthy figures in the Peninsula's Arabic past and attempting to counter European stereotypes of Spain as a land submerged in ignorance and fanaticism.

The chapter explores, additionally, some of the obstacles that would-be naturalists had to surmount in order to accrue respect and recognition. Foremost amongst these were a pervasive disdain amongst the noble classes for any activity that smacked of manual labour and the rival epistemology of scholasticism, which dominated Spain's universities and cherished inductive reasoning over empirical observation. Valentín Foronda highlighted the first problem when he caricatured Spanish nobles as for the most part idle, 'without more talents or recommendations than the ability to mount a horse, to drive a coach and gamble with skill'.⁷ Cadalso's *Gazel Ben-Aly* exposed the shortcomings of scholasticism after he witnessed the teaching of physics in a Spanish university, dismissing the 'machines of experimental physics' that were shown to him as 'a mere child's toy' and observing how 'if you insist upon the immense advantages that result from a knowledge of electricity, from the laws of motion, in both solid and fluid bodies, from the properties of light and from so many other marvels of nature, they will call you a heretic'.⁸

⁶ Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution*, Austin, Texas University Press, 2006, p.2

⁷ Jean Sarrailh, *La España Ilustrada del la segunda mitad del siglo XVIII*, Mexico-Buenos Aires, Fondo de Cultura Económica, 1957, p.243

⁸ Cadalso, *Cartas Marruecas*, p.188. The teaching of medicine was little better according to the Moroccan, being founded entirely upon the authority of the Ancients. 'The medicine that suffices, [the scholastic] will tell you, is that which is extracted from Galen or Hippocrates; rational aphorisms,

The study of natural history challenged these dominant conceptions of honour and learning, since it required both physical exertion and empirical observation. As Renan Silva has indicated in his work on the *ilustrados* of contemporary New Granada

the *type of knowledge* that the New Granadan *ilustrados* were attempting to access presents a characteristic that, in a certain manner, obliged them to modify important aspects of the traditional relationship between intellectual and manual work, between theory and practice, since research in the field of Natural History presupposed, as a matter of necessity, journeys of exploration, the use of instruments, direct observation, in a word what we would today call “field work”; a form of work that introduces in a clear manner an element of “materiality” that is in itself a possible point of rupture with the “scholastic point of view”, which, with its abstractions and formalisations, is the supreme form of rationalization of the distance between material and intellectual work.⁹

Acceptance for its practitioners thus demanded a revision of prevailing social attitudes and intellectual practices and needs to be seen within a wider context of reform taking place in the Hispanic World.

Nature and Nation:

Today, Denmark, Sweden, Russia, even Poland, Germany, Italy, England and France...; all of these peoples, enemies, friends or rivals, excite one another in

supported by good syllogisms are enough to constitute a Doctor’, stated Gazel. ‘If you tell him that, without diminishing the merit of those two great men, the moderns have advanced in this faculty though their greater knowledge of anatomy and botany, which the Ancients did not have, as well as through many medicaments, such as quinine and mercury, that were not used until recently, then he will once more subject you to ridicule’. See Ibid, p.189.

⁹ Renan Silva, *Los Ilustrados de Nueva Granada, 1760-1808: Genealogía de una Comunidad de Interpretación*, Medellín, Fondo Editorial Universidad LATIT, Banco de la República, 2002, p.480

generous emulation to further the progress of the sciences and the arts. Each one meditates upon the acquisitions and advances that emanate from other nations; each one of them until now has made some useful discovery, which has served to benefit Humanity. But what do we owe to Spain? After two centuries, after four, after ten, what has been done in that region for Europe? Thus pondered the Frenchman Nicolas Masson de Morvilliers in 1783, as he wrote the article 'Espagne' for the latest edition of the *Encyclopédie*. And his answer was 'not much'. Spain was, in Masson's view, in desperate need of 'our arts and of our manufactures'. Her savants were 'obliged to instruct themselves with our books', and the country suffered from 'a lack of mathematicians, physicists, astronomers and naturalists'. Spain was, indeed, a fallen power, whose intellectual development had been inhibited by fanaticism. 'Her religious ceremonies, her priests, her monks have turned this colossal nation into a people of pygmies'.¹⁰

Masson's unflattering appraisal encapsulated prevailing views of Spain as a country immersed in ignorance and barbarism, recycling images from the sixteenth-century Black Legend. It cast the Iberians as avaricious fanatics, their intellectual development strangled by the infamous Inquisition and their exploratory impulses stirred only by the prospect of precious metals. Masson's compatriot, the naturalist Charles Anathuse de Walckenaer, recapitulated this allegation with specific reference to Spain's activities in the New World, when he complained that the Spanish and Portuguese 'hid from the investigatory eye of science those countries they seized', concealing South America's natural riches from the scrutiny of more cultivated

¹⁰ Antonio Ponz, *Viaje de España, Seguido de los dos Tomos del Viaje Fuera de España*, Madrid, M. Aguilar, 1947, p.1790

powers.¹¹ The British comparative anatomist, William Clift, meanwhile, speculating as to why greater efforts had not been made in the Río de la Plata region to capitalise upon the discovery of the skeleton of an extinct giant sloth in 1789, ascribed this oversight to ‘the jealousies which probably bestrew the path of exploration in a country where the almost all-engrossing subject of search for the precious metals absorbs or blunts all feelings, together with an apparent indifference in the inhabitants for inquiries of this thriftless nature’.¹²

The late eighteenth-century witnessed a conscious effort on behalf of the Spanish government to exorcise such unflattering stereotypes. The influence of the French Enlightenment and the installation upon the Spanish throne of the new Bourbon dynasty combined to inaugurate a new approach towards learning, and particularly the natural sciences. Botanical gardens and natural history cabinets were founded or revived. Scientific expeditions were dispatched to study the resources of the New World, whilst, throughout the 1770s and 1780s ‘the Council of the Indies tirelessly sent out orders to colonial officials to research, collect and ship to Madrid natural ‘curiosities’ and, above all, medicinal herbs’.¹³

Masson’s bleak assessment of Spanish intellectual life, if it had ever been correct, was thus no longer valid by 1783, and provoked an angry reaction from Spaniards. Image-conscious Iberians, disputing the Frenchman’s slanders, publicised

¹¹ Félix de Azara, *Viajes por la América del Sur desde 1789 hasta 1801*, Comercio del Plata, Montevideo, 1846, p.5

¹² William Clift, ‘Notice on the Megatherium brought from Buenos Ayres by Woodbine Parish’, *Transactions of the Geological Society*, London, 1835, p.438. The Swiss naturalist Johann Jakob Scheuchzer also alleged in his *Bibliotheca Scriptorum Historiae Naturali omnium Terrae Regionum inservientium* (1716) that Spanish plants had been ‘described more by foreigners than by the inhabitants themselves’. See Alix Cooper, *Inventing the Indigenous: Local Knowledge and Natural History in Early Modern Europe*, Cambridge, Cambridge University Press, 2007, p.163

¹³ Paula de Vos, ‘Research, Development and Empire: State Support of Science in the Later Spanish Empire’, *Colonial Latin America Review*, Vol.15, No.1, June 2006, p.60

the achievements of Spanish savants and imbued them with national significance. José Garriga, for instance, published Juan Bautista Bru's description of the megatherium skeleton displayed in the Real Gabinete in 1796. The Spaniard hoped, in so doing, 'not only to do the necessary justice to Don Juan Bautista Bru, but also to our Nation, by showing that the Naturalists of Spain have not been so neglectful as to have failed to describe with the greatest prolixity this Skeleton, which is the first of its species to arrive in the Kingdom of the three known to exist'.¹⁴

Useful Nature

Spain's engagement with the sciences was characterised by an emphasis on the practical. Iris Wilson Engstrand has argued that 'the hope of the Spaniards, unlike certain of the French *philosophes*, was that the discovery and application of useful knowledge would improve life in a practical way'.¹⁵ Jean Sarrailh notes, similarly, that 'in the struggle between the "intellectual" sciences and the "utilitarian" sciences, the latter are those that appear to triumph'.¹⁶ Discoveries and projects that offered clear economic, medical or social benefits were prioritised over more abstract or theoretical forms of science, the utility of which was less immediately obvious.

José Clavijo y Fajardo, editor of the periodical *El Pensador* and subsequently deputy director of the Real Gabinete de Historia Natural, exemplified this utilitarian

¹⁴ José Garriga, *Descripción del Esqueleto de un Quadrúpedo muy corpulento y raro que se conserva en el Real Gabinete de Historia Natural de Madrid*, Madrid, Imprenta de la Viuda de Ibarra, 1796, p.1

¹⁵ Iris Wilson Engstrand, *Spanish Scientists in the New World: The Eighteenth-Century Expeditions*, Seattle, University of Washington Press, 1981, p.xi

¹⁶ Sarrailh, *La España Ilustrada*, p.178. Eduardo Estrella observes, likewise, that Spaniards prioritised the practical applications of natural history, conscious that 'the renovation of the pharmaceutical arsenal, naval construction, agriculture, [and] textile manufacture all need plants that must be identified, processed in their [place] of origin or naturalised in other regions for the purpose of exploitation'. See Eduardo Estrella, 'Expediciones Botánicas', in Antonio Lafuente, José Pcsset, and Manuel Sellés (eds.), *Carlos III y la Ciencia de la Ilustración*, Madrid, Alianza Editorial, 1988, p.331

stance when he evaluated the merits of two recent inventions – the hot air balloon and the lightning conductor. In the hands of daring aviators like the Montgolfier brothers the hot air balloon had exhilarated crowds throughout Europe. The Parisian chronicler Louis Sebastien Mercier described the first ever balloon flight in 1783 as ‘the most astounding achievement the science of physics has yet given to the world’.¹⁷ The Infante Gabriel was also apparently much taken with this new creation, ‘whose every progress he follows’.¹⁸ Unlike these enthusiasts, the more sober Clavijo distanced himself from the popular ecstasy surrounding the intrepid aeronauts and elected to suspend his judgement on the true merit of the balloon until it had proven its utility to mankind. ‘I will not make any particular mention of the aerostatic machine of the Montgolfier brothers’, declared Clavijo, ‘because although the ability to elevate oneself above the clouds and to travel four or six thousand varas in altitude is perhaps the most surprising discovery of our times, *one must await the results of this invention before one can determine whether it should be placed amongst those of mere curiosity or amongst the discoveries useful to the human race*’ (my italics). Whilst the hot air balloon thus failed to convince Clavijo, Benjamin Franklin’s lightning conductor amply satisfied the Spaniard’s criteria for utility. Clavijo singled out the device for a ‘special mention’. He could barely suppress his admiration for this wondrous invention, which saved lives and preserved properties, and he challenged anyone to dispute the merit of a discovery whose object was ‘to dissipate storms, to govern, if one may put it thus, the ray [of lightning] and to preserve buildings and their

¹⁷ Jeremy D. Popkin (ed.), *Panorama of Paris: Selections from Le Tableau de Paris by Louis Sébastien Mercier*, Pennsylvania, Pennsylvania State University Press, 1999, p.197

¹⁸ José Antonio Cavanilles, *Observations de M. L'Abbé Cavanilles sur l'Article 'Espagne' de la Nouvelle Encyclopédie*, Paris, Alex Jombert Jeune, 1784, p.36

inhabitants from the death and destruction with which the most terrible bolts often threaten them'.¹⁹

Clavijo's position typified the broader aims of Spanish science. In the eighteenth-century, Spaniards were not looking for spectacular publicity stunts or impenetrable theories, but for discoveries that would improve their country's agriculture and revitalise its stagnant economy. Spanish naturalists duly sought plants and animals that could be cultivated or farmed for a profit. They searched for new crops that could be acclimatised in the Iberian Peninsula or elsewhere in the empire, replacing foreign imports. They also sought substances with medicinal properties, or which could be used for industrial purposes, benefiting public health and invigorating native manufactures. As a contemporary writer, Martín Rodón y Bell observed:

Botany is capable of supplying, and in effect supplies, a thousand ideas favourable to the progress of agriculture, of gardening, of the raising of cattle, of dying and of various species of manufacture, all of which foment and gives abundant material for commerce, which is of such importance to the economy of a state, since it is one of the arms that sustains it'.²⁰

The director of the Real Jardín Botánico, Casimiro Gómez Ortega, propounded this consciously practical approach to natural history in 1777, when he compiled a series of instructions for the botanists Hipólito Ruíz and José Pavón, in preparation for their forthcoming voyage to Peru. Amongst various orders and

¹⁹ Joseph Clavijo-Fajardo, *Historia Natural, General y Particular, escrita en francés por el Conde de BUFFON, Intendente del Real Gabinete y del Jardín Botánico del Rey Christianísimo, y Miembro de las Academias Francesa y de las Ciencias*, Vol. I, Madrid, Imprenta de la Viuda de Ibarra, 1791, pp.xlvii – xlviii

²⁰ 'Breve discurso que para dar principio a los primeros ejercicios públicos de la Botánica que se celebraron el día 3 de Noviembre del año de 1788 en la Sala del Real Jardín Botánico de Cartagena, dixo el Dr. D. Martín Rodon y Bell, primer Médico interino del Real Hospital Militar de esta Plaza', *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, Madrid, Imprenta Real, July 1789, pp.597-598

recommendations, Ortega commanded his protégés to write ‘the definition and description of every plant, in accordance with the principles of Botanical Rules of Linnaeus, and following his sexual method, which has been generally adopted [in Europe]’.²¹ The Spaniard advised Ruíz and Pavón to form ‘a collection of seeds and dried fruits, of rubbers, resins, balsams and any other parts of plants that have some use’.²² He also entreated them to apprise themselves of the conditions and climate in which these plants prospered, so that they might be transplanted with success to different parts of the Iberian Peninsula. ‘Since the principal object of this voyage is not so much the pure theoretical knowledge of new and useful vegetables, as their acquisition, so that their use may be introduced and propagated in Spain, and even in other countries, furthering the sciences, commerce and the benefit of humanity, our botanists must not content themselves with examining the plants, describing them and conserving their skeletons in herbariums’, stipulated Ortega. In addition to these tasks, they must ‘diligently make remissions of bulbs, grasses, mosses and live plants whenever they have the opportunity, sending them to the Secretary of State and the Office of the Indies, upon whose orders they will be deposited and cultivated in the Real Jardín Botánico in Madrid, so that upon their return the travelling botanists can observe them more carefully, perfecting their descriptions; and in the same garden care will be taken to multiply them and to carry out experiments on them in order to acclimatise them to the climate and soil of some territory of Spain’.²³

²¹ Casimiro Gómez-Ortega, ‘Instrucción a que deberán arreglarse los sujetos destinados por S.M. para pasar en la América Meridional, en compañía del Médico don Joseph Dombey, a fin de reconocer las plantas y yerbas y de hacer observaciones botánicas en aquellas partes’, in Hipólito Ruíz, *Relación histórica del viage que hizo a los Reynos del Perú y Chile el Botánico D. Hipólito Ruíz en el año de 1777 hasta el de 1788, en cuya época regresó a Madrid*, ed. Jaime Jaramillo-Arango, Madrid, 1952, Vol. I, p.395

²² *Ibid.*, p.400

²³ *Ibid.*, p.398-399

Ortega evidenced a similarly utilitarian stance in his 1779 *Instrucción sobre el modo más seguro y económico de transportar plantas vivas por mar y tierra a los países más distantes*, in which he proffered advice on the transportation and preservation of plants, this time for a less specialist audience. Introducing the work, the Spaniard outlined the types of plants that would be most welcomed in the botanical garden, prioritising those noted for ‘their use in commerce, agriculture, or in the arts and physical sciences’.²⁴ The botanist suggested that Spain, by making better use of the vegetable riches of her empire, could reduce her dependence on other countries and reinvigorate her economy, and he described how guavas and papayas, ‘fruits from America never before seen in our peninsula’ had germinated recently in the Real Jardín Botánico, from whence they had been distributed to other gardens in milder regions, ‘where they will doubtless prosper’.²⁵ Ortega went on to commend the sixteenth-century conquistadors for bringing New World plants to Spain, enjoining his compatriots to imitate the French and the British, who had successfully domesticated some economically valuable flora. He reported that the French had succeeded in cultivating coffee on the island of Martinique with seeds poached from the Dutch Indies and nurtured in the Parisian botanical garden, with the result that the ‘harvest [of the island’s coffee beans] not only now supplies [the product’s] immense consumption in France, but that considerable portions of it are introduced through commerce to other kingdoms of Europe’.²⁶ He observed, likewise, how the British had introduced a tea tree into Kew Gardens, an acquisition that promised to save

²⁴ Casimiro Gómez-Ortega, *Instrucción sobre el modo más seguro y económico de transportar plantas vivas por mar y tierra a los países más distantes*, Madrid, Joachin Ibarra, 1779, p.11

²⁵ *Ibid.*, p.9

²⁶ *Ibid.*, pp.5-6

Britain the thousands of pounds she spent every year in China on a staple that 'fashion or custom have made almost a general and primary necessity in England'.²⁷

If eighteenth-century Spanish science was characterised by its emphasis upon the practical, then it was also characterised by its close association with the Crown. Mauricio Nieto has argued that botanical expeditions choreographed and financed by Charles III constituted 'the most ambitious and costly botanical project of the entire Enlightenment'.²⁸ Angel Guirao and Fermín del Pino concur with this verdict, suggesting that 'this official origin of science enables us to understand the sudden splendour that certain scientific activities experienced: botany, navigation, astronomy etc.', though they also point to the precarious nature of this state-dependent form of science, which relied heavily upon monarchical backing in order to thrive. Guirao and del Pino contend, persuasively, that one may talk of a 'Latin model for science, more dependent upon official aid than the Anglo-Saxon one'. 'It is possible', hypothesise Guirao and del Pino, 'that our standard image of a science practised by free savants and supported out of social interest by various academies or private societies proceeds rather from an English model than from other Latin countries', such as France and Italy.²⁹

The role played by the Spanish Crown in promoting the natural sciences was noted by contemporaries, both Spanish and non-Spanish. The French naturalist Charles Anathuse Walckenaer complimented Spain upon her recent decision to

²⁷ Ibid., pp.4-5. Ortega's pragmatic approach to the natural sciences seems to have resonated with his compatriots, several of whom emphasised the practical applications of botany. Félix de Azara, for instance, scrutinised the flora of Paraguay from a notably utilitarian standpoint, speculating that one tree, the Curay, might serve for making ships' masts whilst the fruit of another plant, the Chaco algarroba, 'once pulverised, is at least as good as the agalla for as a dye, and may serve for uses other than dying'. See Azara, *Viajes*, p.57

²⁸ Nieto, *Remedios*, p.48

²⁹ Angel Guirao, and Fermín del Pino, 'Expediciones Ilustradas y Estado Español', *Revista de Indias*, Vol 47, 1987 pp.427-428

embrace scientific study and recorded with approval how 'the Spanish Government has not only tolerated but has helped and protected the work of the wise and valiant foreigner, Mr. De Humboldt [sic], who has mapped, observed and described, the vast possessions of Spain in America with the consummate science of a Geographer, a Physicist and a Naturalist, and who is publishing the results of his researches as I write'.³⁰ Humboldt himself arrived at a similarly laudatory conclusion. The Prussian speculated that 'no European government has sacrificed greater sums to advance the knowledge of the vegetable kingdom than the Spanish government'. He commended the 'three botanical expeditions, in Peru, new Granada and New Spain, under the direction of MM. Ruiz and Pavón, Don José Celestino Mutis and MM. Sessé and Mociño, [which] have cost the state nearly two million francs' and he also pointed out that 'all these researches, conducted during twenty years in the most fertile regions of the new continent, have not only enriched science with more than four thousand new species of plants, but have contributed much to diffuse a taste for natural history among the inhabitants of the country'. 'M. Mociño...who has pushed his laborious excursions from the kingdom of Guatemala to the northwest coast or island of Vancouver and Quadra; and M. Echeveria, a painter of plants and animals whose works will bear comparison with the most perfect productions of Europe, are both natives of New Spain', commented Humboldt. 'They had both attained a distinguished rank among savants and artists before quitting their country [for Spain]'.³¹

³⁰ Azara, *Viajes*, p.7

³¹ Alexander von Humboldt, *Political Essay on the Kingdom of New Spain*, Translated and Edited by John Black, London, 1811, cited in John Lynch (ed.), *Latin American Revolutions 1808-1826*, Norman and London, University of Oklahoma Press, 1994, pp.293-294

Spanish commentators also frequently associated scientific progress directly with the diligence of Charles III and Charles IV – particularly the former. In a speech delivered at the Real Jardín Botánico in 1786, the botanist Vicente Cervantes alluded to the ‘great and effective assistance dispensed by the King, our Lord, to Botany’.³² Joseph Clavijo Fajardo listed the establishment of the Real Gabinete de Historia Natural among ‘the great benefits that the Nation owes to our benign Sovereign, DON CARLOS III’,³³ whilst the military cadet Mateo Gutiérrez, inaugurating a course in astronomy in 1794, saluted the Crown for its patronage of the sciences and warmly commended such royal generosity. ‘[T]he magnificent observatory that is currently being constructed at the expense of His Majesty; the precious collection of instruments that is destined for it; the establishment of a teaching format that fulfils the designs of the Sovereign; that of two professorships that has just been effected through the offices of His Excellency the Duke of Alcudia [the royal favourite Manuel de Godoy]’, pondered Gutiérrez; ‘what does all of this denote other than the ardent desires [of the King] to encourage and propagate a science so useful to the state?’.³⁴

Past Masters

Spain’s engagement with natural history was largely a utilitarian, state-led phenomenon. It was also, in many ways, an imported one, as the Spanish Crown sponsored promising subjects to travel abroad to receive instruction and enlisted the

³² ‘Botánica – Relación de ejercicios públicos que de esta facultad se han tenido en los días 6 y 9 de este Mes, en el Real Jardín de esta Corte’, *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, December 1786, Madrid, Imprenta Real, 1786, p.498

³³ Clavijo-Fajardo, *Historia Natural*, p.xi

³⁴ Mateo Gutiérrez, ‘Real Estudio de Astronomía’, *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, Madrid, Imprenta Real, July, April 1794, pp.105-106

services of foreign naturalists to teach and study science in Spain and its colonies. The Czech naturalist Tadeo Haenke and the Frenchman Luís Née accompanied Alessandro Malaspina in his circumnavigation of the globe (1790-1795), whilst the French chemist Louis Proust was employed as a teacher in Segovia and Salamanca. Spanish savants eagerly translated esteemed foreign texts, such as the Abbé Pluche's *Espectacle de la Nature* (published in 1753 and again in 1771) and Buffon's *Histoire Naturelle* (1785 and 1791). They expressed the hope that these works would educate their countrymen in 'the rudiments of this important science'.³⁵

Gómez Ortega's instructions to Ruíz and Pavón offer a good example of the Spanish dependence upon foreign expertise. The Peruvian expedition was conceived from the outset as a collaborative venture between France and Spain, and Ortega repeatedly urged his botanists to avail themselves of the botanical acumen of their French collaborator, Joseph Dombey, though emphasising at all times that Ruíz and Pavón were Dombey's equals on the expedition, and not his inferiors. The Spaniard stipulated at one point that his compatriots should consult Dombey if faced with a plant that eluded classification, 'turning to him in those cases when they believe it necessary, or when it would be useful to them to capitalise upon his knowledge and experience'.³⁶ Ortega also provisioned Ruíz and Pavón with Spanish translations of botanical works, such as Linnaeus' *Philosophia Botanica*, and he advised them to peruse the Swede's 'small summary of that which travelling botanists should have, of the books and instruments that they should take with them and even the dress that is

³⁵ Clavijo-Fajardo, *Historia Natural*, p.lvii

³⁶ Ortega, 'Instrucción', p.393. La Condamine's expedition to Quito in 1735 witnessed an even heavier reliance on French expertise. On this occasion, the Spaniards Jorge Juan and Antonio Ulloa assumed a subordinate role in the enterprise, which was conceived and led by a French savant.

most suitable for a man who occupies himself in the field making botanical observations, and the distribution of hours of work in the day'.³⁷

Whilst Spain's interest in natural history was thus to a significant degree recent and derivative, some Spaniards attempted to give it a more patriotic twist. Goaded by foreign critics such as Masson, they scoured the past for suitably worthy predecessors. To repudiate Masson's allegation that Spain had made no 'useful discovery' in the past ten centuries, and that 'she lacks mathematicians, physicists, astronomers and naturalists', Spanish commentators adduced the achievements of sixteenth and seventeenth-century savants who had attracted international recognition. They depicted these individuals as worthy precursors to contemporary naturalists, situating eighteenth-century developments within a deep-rooted scientific tradition.

One tract that exemplifies this strategy is Ignacio de Asso's 'Discurso sobre los Naturalistas Españoles' (1801). In this article, del Asso expounded upon 'the flourishing state of Natural History in Spain in the course of the sixteenth century and part of the following one', venerating those of his compatriots who had contributed to the natural sciences.³⁸ The Spaniard exalted Gonzalo Fernández de Oviedo, to whom 'we owe the first news and description of many plants and animals of the New World'.³⁹ He glorified Nicolás Monardes, whose natural history cabinet was 'the second oldest of all those known in Europe in that epoch',⁴⁰ and he praised Francisco Hernández, 'so famous in our literary history of the sixteenth century'.⁴¹ De Asso

³⁷ Ibid., p.396

³⁸ Ignacio de Asso, 'Discurso sobre los Naturalistas Españoles por D. Ignacio de Asso', *Anales de Historia Natural*, Mes de Enero de 1801, Númº. 7, Madrid, Imprenta Real, 1801, p.170

³⁹ Ibid., p.171

⁴⁰ Ibid., p.171

⁴¹ Ibid., p.172

proclaimed that the achievements of these men ‘attest to the great application of the Spaniards in natural history in the sixteenth century’,⁴² and he insisted, moreover, that such achievements did not evaporate in the calamitous seventeenth century, as other commentators had supposed, for these otherwise gloomy years boasted a healthy number of savants. There was, for instance, Gregorio Bolívar, a Franciscan monk ‘who in 1695 had almost perfected the history of the animals of the New World’.⁴³ There was also Alonso Martínez Espinar, whose 1644 *Arte de Ballestería* included, in spite of its unpromising title, numerous valuable zoological observations.⁴⁴

A comparable approach to Spain’s scientific past surfaces in Clavijo Fajardo’s translation of Buffon. In a monstrously long footnote in the introduction, the author confessed that the study of the animal and mineral kingdoms was, at present, somewhat ‘backward’ in Spain. He asserted, however, that that this had not always been the case, since, ‘in previous centuries, in those times when several Nations aspired to have Instruction without knowing the best means to acquire it, Spain was not the last to dedicate itself to the study of Natural History, and, if it did not attain primacy [in this field], it at least anticipated several of our neighbours who now treat us with so much disdain, discourtesy and even injustice’.⁴⁵ To corroborate this claim, Clavijo summarised Spanish discoveries over the past thousand years, summoning an impressive total of thirty-two pre-eighteenth-century naturalists whose work had brought honour to their homeland. His cast of savants ranged from well-known individuals like Hernández and Monardes to more obscure men such as Ebn-Beithar,

⁴² Ibid., p.173

⁴³ Ibid., p.177

⁴⁴ Ibid., p.177

⁴⁵ Clavijo-Fajardo, *Historia Natural*, Footnote p.v

a native of Malaga (and presumably, from his name, of Moorish descent), who wrote three volumes on botany and agriculture in the fifteenth century.⁴⁶

Clavijo's contemporary Antonio Ponz likewise rebutted Masson's slanders by means of a list, though he concentrated his defence on newly discovered products rather than erudite Spaniards. Reviewing Spain's botanical achievements, Ponz credited his ancestors with the study and cultivation of many prized plants. He presented the sixteenth-century conquest of America as botanical as well as military in character, and he documented how his Spanish forebears had 'analysed the productions of the different countries', 'extend[ing the cultivation] of cacao, indigo, cochineal, tobacco, cotton, etc.', and 'experiment[ing] with quinine, balsams, sarsaparilla and all the other medicinal plants'. 'What more does Europe owe to the rest of its nations?' jeered Ponz caustically, paraphrasing Masson.⁴⁷

Del Asso, Clavijo and Ponz were militant defenders of Spain's scientific record. Other writers were more tentative, conceding that Spain's progress had accelerated in recent years. Even the more cautious, however, identified national precedents for this welcome development, construing eighteenth-century advances as a revival of a lapsed tradition rather than the creation of a new one. Responding, like Ponz, to Masson's invective, for example, the clergyman Antonio José de Cavanilles conceded that botany had 'in a short time made such rapid progress in the footsteps of Linnaeus', yet he emphasised that 'botany was cultivated in Spain before him [the Swede], and continues to be cultivated in our time'.⁴⁸ The Valencian reprised this theme later in the same tract, when he extolled the merits of Madrid's botanical

⁴⁶ Ibid., Footnote pp.v-xi

⁴⁷ Ponz, *Viaje*, p.1795

⁴⁸ Cavanilles, *Espagnes*, p.70

garden, an establishment he considered ‘worthy of the envy of other nations’.

Cavanilles, who served as the garden’s director in from 1801 to 1804, declared that ‘such rapid progress in so few years proves sufficiently that my nation is neither lazy nor numb’. He acknowledged the recent surge in scientific activity, but he reasoned that, rapid as these advances were, they could not have been made if the foundations for progress had not already been in place, for ‘if [Spain] has found suddenly in her midst such excellent professors, she must have cultivated the sciences beforehand’.⁴⁹

A document entitled *Noticia del descubrimiento de e impresión de los mss. de Historia natural de Nueva España del Dóctor Francisco Hernández* traced an even more direct link between contemporary expeditions and their sixteenth-century predecessors. This document adduced the Crown’s desire to complete the botanical discoveries of Francisco Hernández as the primary rationale behind Martín Sessé’s expedition to New Spain (1795-1803), citing the recent location of the botanist’s manuscripts as the inspiration for the research. According to its author, Sessé and his colleagues were sent to New Spain at the Crown’s expense, ‘with the task of collecting, describing, drawing and illuminating all of the natural productions of that kingdom, especially those noted by Hernández’.⁵⁰ Spain, therefore, had a botanical heritage on which to build.

If the above appraisals of Spain’s scientific past differed in emphasis, they shared several common features. First amongst these was the need for external vindication. Ignacio de Asso, anxious to demonstrate the international esteem accorded to his sixteenth and seventeenth-century naturalists, scrutinised the writings of their European contemporaries for laudatory comments. Oviedo’s status as the first

⁴⁹ Ibid., p.72

⁵⁰ *Noticia del descubrimiento de e impresión de los mss. de Historia natural de Nueva España del Dóctor Francisco Hernández*, Madrid, Imprenta Real, 1790, p.2

reporter of New World plants and animals was confirmed by ‘dispassionate foreigners, such as Señor Paw [de Pauw] and Bekeman’. A letter from Juan Wower, a writer from Hamburg, to Rodrigo Zamorano, Cosmographer of the Indies, was cited as evidence of how the latter’s natural history cabinet ‘extended its reputation to foreign countries’, whilst de Asso, in an effort to verify Hernández’s widespread fame, quoted from a letter written by Livino de Sura to Carolus Clusius in 1542, in which the Neapolitan claimed that he ‘got to know Hernández in Naples, and that he examined with admiration the manuscript of his observations on America, with the drawings of plants and animals’.⁵¹

Cavanilles mustered similar proof of external approbation to validate his claims for past scientific excellence when he recorded how Linnaeus and his son ‘knowing the merit of many of our compatriots, immortalised them in their works by giving their names to different genres of plants (Queria, Minuartia, Veletia, Ortega, Salvadora, Monarda, Ovieda, Barnadesia, Mutisia, Castilleja etc.)’.⁵² Some of these names, Cavanilles admitted, were drawn from the current crop of Spanish naturalists – *Mutisia*, for example, honoured Celestino Mutis, director of the botanical expedition of New Granada; *Ortega* was named after Casimiro Gómez Ortega, current director of the Real Jardín Botánico. Other botanical dedications, however, such as *Monarda* (after Nicolás Monardes) and *Ovieda* (after Gonzalo Fernández de Oviedo), commemorated sixteenth-century savants, thus attesting Spain’s earlier proficiency in this area.

Clavijo Fajardo also marshalled the testimony of foreigners to bolster his argument, though he adopted a slightly different tactic. Concluding his assessment of

⁵¹ De Asso, *Discurso*, pp.171-172

⁵² Cavanilles, *Espagne*, p.70

Spain's contribution to natural history, Clavijo conjectured that the translation of many Spanish works into other European languages must signify their value, for why else would anyone go to the trouble of disseminating them? The Spaniard proffered several examples of works that had been translated, including Oviedo's *Historia General y Natural de las Indias*, which was converted into Italian and French, Hernández's manuscripts, which were published in Italian by Nardo Antonio Recchi, and Monardes' works, which appeared in Italian, English and Latin. 'If in Spain there has reigned such ignorance', postulated Clavijo, 'and if the Spanish have written nothing worthy of appreciation, then to what end have such learned nations undertaken the labour of translating and studying their works?' Moreover – and herein lay the real gripe - 'if these [works] are useful, and those same nations have benefited from them, then why such ingratitude?'⁵³

A second common theme that linked eighteenth-century appraisals of Spain's contribution to natural history was the priority granted to botany, the field in which Spaniards had exhibited greatest prowess. Cavanilles, confident in the excellence of the Real Jardín Botánico, challenged doubting Frenchmen to inspect its contents for themselves, and having done so, 'to say that [the institution] does not contain all that one could wish for, not merely from an infant nation, but from one that has already employed all of its means'.⁵⁴ De Asso acclaimed in similar fashion the garden of Aranjuez, founded through 'the greatness of Philip II', contending that the garden's creation pre-dated 'by many years' that of its rivals in Paris and Montpellier, 'and can compete in antiquity with those of Padua and Pisa, reputed to be the first in Europe',⁵⁵

⁵³ Clavijo-Fajardo, *Historia Natural*, Footnote p.viii

⁵⁴ Cavanilles, *Espagne*, p.72

⁵⁵ De Asso, *Discurso*, p.173

whilst even the journalist Juan Blasco Negrillo, who lamented the widespread ignorance of the natural sciences in Spain, exempted botany from his criticisms. In a footnote to an article on the merits of Natural History (see below), Negrillo specified that ‘we do not speak here of Botany, a science quite extended amongst us, and in which we have made such progress that we probably have nothing to envy foreigners’. ‘We could also name a great portion of subjects well known in Europe for their celebrity in this area’, continued Negrillo, ‘the number of whom equals, when it does not exceed, the most distinguished men of other countries’.⁵⁶ Spain was thus no newcomer to the botanical scene, but had plenty of experience upon which to draw and plenty of past scholars to emulate.

Morals and Monuments

Spain may have boasted a robust tradition of botanical excellence. The eighteenth-century, nevertheless, witnessed the resumption of older projects and a shift in attitudes towards scientific practitioners. One barometer for these changing attitudes was the manner in which savants were commemorated and memorialised. In the early eighteenth century, as Cadalso complained, the student of natural history lived in obscurity and was promptly consigned to oblivion when he died. By the end of the century, however, the naturalist could hope for a more dignified legacy, perhaps being honoured with a suitable monument, or, at the very least, lending his name to a new species of plant. This development may be viewed as part of the wider effort to revive Spain’s flagging scholarly reputation. ‘Sensitive to negative images, the intelligentsia believed that not only was it important for Spain to participate in the scientific and

⁵⁶ Juan Blasco Negrillo, ‘De lo que debe entenderse por Historia Natural, de los diferentes ramos que abraza, y de las utilidades que pueden sacarse de su cultivo y estudio’, *Variedades de Ciencias, Literatura y Artes*, Vol II, Madrid, Don Benito García y Compañía, 1804, Footnote p.29

intellectual developments of the period, but to display its active engagement in both visual and written media'.⁵⁷

Illustrative of the increased reverence accorded to Spanish savants is a document entitled *Elogio histórico de Señor Don Antonio de Pineda y Ramírez, Coronel de los Reales Ejércitos, Primer Teniente de Reales Guardias Españolas y Encargado de la Historia Natural en la última Expedición destinada a la América y el Asia* (1792). Pineda, the subject of this eulogy, had served as chief naturalist aboard the Malaspina expedition (1790-1795). He had contracted a fever whilst exploring the island of Luzon in the Philippines and expired in the village of Badoca in 1792.

According to the *Elogio*, Pineda's colleagues, saddened by his untimely demise, decided to 'perpetuate his memory and labours' by 'erecting to him a sumptuous Mausoleum in those far reaches of the Spanish Empire'. Unfortunately this noble project was not completed without opposition. The erection of a monument in honour of a naturalist seems to have represented something of a departure from tradition, and 'this species of posthumous honours not having been seen before, there were excited those irksome and impertinent contradictions that have, in other times, deprived the Sciences and the Nation of a thousand precious and perhaps irreparable monuments'.⁵⁸

Luckily, Pineda's Mausoleum escaped this fate. The initial grumblings were rapidly defused and the King himself interceded to ensure that the deceased savant received his well-earned reward. 'Since we live in the splendid century of CARLOS III and CARLOS IV', continued the *Elogio*, 'these shadows were soon dissipated'.

⁵⁷ Susan Deans-Smith, 'Creating the Colonial Subject: Casta Paintings, Collectors and Critics in Eighteenth-Century Mexico and Spain', *Colonial Latin American Review*, Vol. 14, No. 2, December 2005, p.176

⁵⁸ José Hipólito Unanue, *Elogio histórico del señor Don Antonio de Pineda y Ramírez, Coronel de los Reales Ejércitos, primer Teniente de Reales Guardias Españoles, y Encargado de la Historia Natural en la última Expedición destinada a la América y el Asia*, Madrid, 1792, pp. 11

‘The Pyramid and inscription were put up in the Botanical Garden of Manilla’, where ‘Friendship, symbolised by an inextinguishable flame, gives new life, and Flora surrounds with its charming garlands the tender and respectable memory of Señor Don Antonio de la Pineda y Ramírez, whom we may justly call a *Martyr to the study of Nature*’.⁵⁹

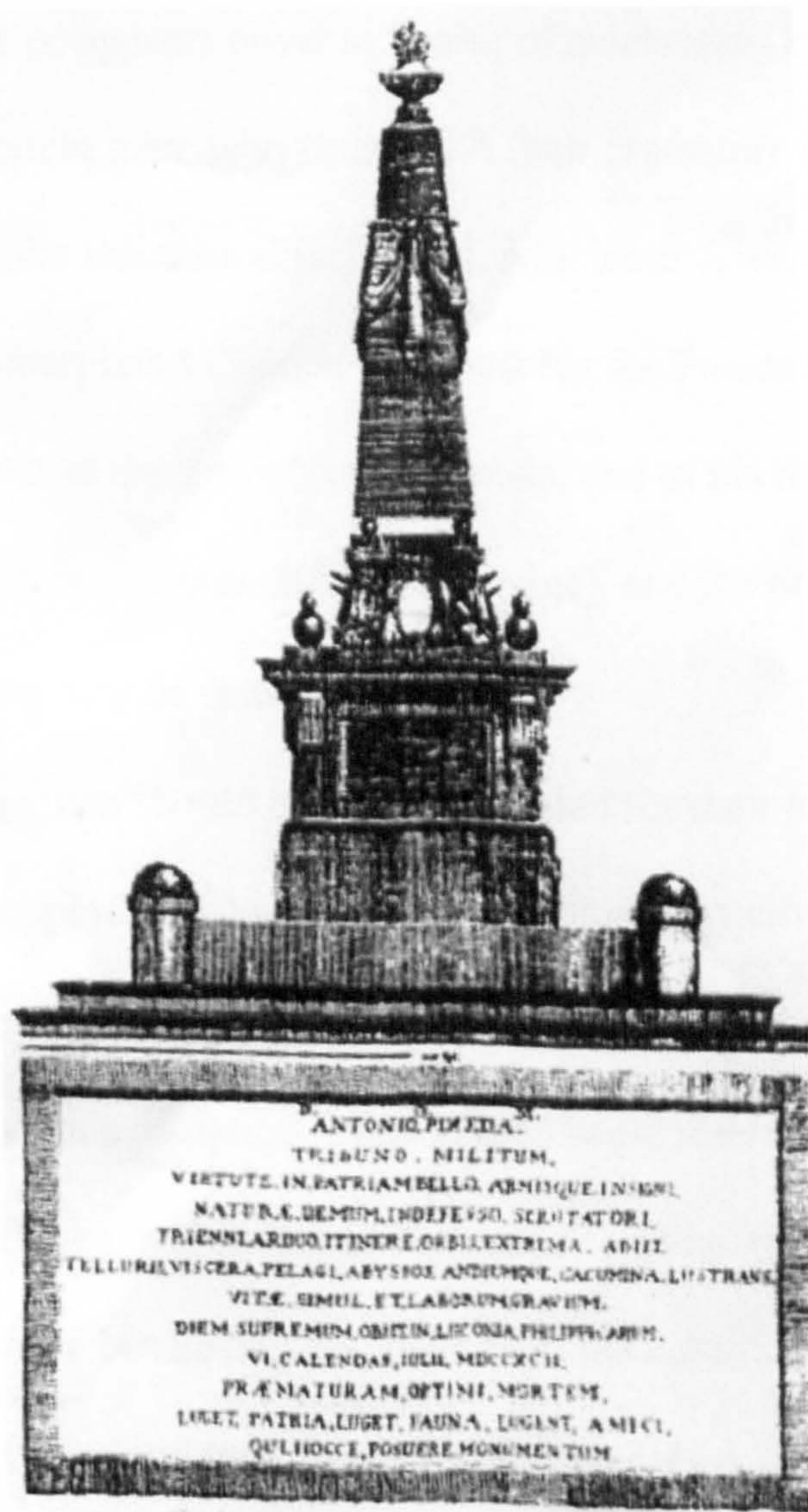


Fig.2: Mausoleum erected in honour of Antonio Pineda in the Philippines on 6 July 1792, as pictured in *El Mercurio Peruano*, Vo.IX, núm.281, 1793. From Jean-Pierre Clément (ed.), *El Mercurio Peruano, 1790-1795*, Vol.II, Frankfurt, Vervuert, 1998

The Pineda monument was remarkable primarily for its novelty. The *Elogio* specified that this style of memorial was a phenomenon that ‘had not been seen’ in the

⁵⁹ Ibid., pp.11-12

Hispanic World, whilst an article about Pineda in the *Memorial Literario* expressed similar surprise at this new form of commemoration and commended Charles IV for his role in its erection. The article reported that the King had reimbursed Pineda's colleagues for the expenses they had incurred in constructing the mausoleum and commissioned a more polished memorial for display in the Real Jardín Botánico. It applauded this 'trait, that appears novel in Spain, of celebrating in this way the memory of those excellent men, who cause with their premature deaths such a loss to the sciences, in particular the natural [sciences], which our Sovereign promotes with such fervour', and it interpreted Charles's support for the Pineda monument as evidence of 'his sadness at the loss of Señor Pineda, and of his desire for the glorious progress of the Spanish in this branch [of knowledge], and the prize with which merit is rewarded wherever it may be found'.⁶⁰

The notion that men should be commemorated for their learning and scholarly feats found another supporter in the Spanish traveller and art critic Antonio Ponz, who recorded his impressions of a statue of Buffon in the Parisian Botanical Garden. Assessing the merits of this sculpture, Ponz voiced some reservations as to the aesthetic value of the piece, which lurked nude next to a stairway, draped in a strategically placed cloth, but he had no doubt as to the cultural significance of the project. The Spaniard surmised that 'whatever one may think of the statue, this is the most flattering way of rewarding the merit of great men, even before their lives come to an end [Buffon did not die until 1788]'. He exhorted his compatriots to imitate the French in thus honouring their most accomplished savants, and he predicted that, were they to heed his advice, then the results would be not merely gratifying for the individuals thus celebrated, but beneficial to society as a whole. 'I have always

⁶⁰ 'Historia Natural. Premio Real del mérito literario', *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, Madrid, Imprenta Real, May 1794, p.164

believed that the statues and public monuments that the Greeks and Romans were in the habit of erecting in honour of their famous men were not the least stimulus for others to imitate them, and to sweat in all lines [of work] in order to achieve equal honour', ruminated Ponz, who anticipated similar exertions on the part of his compatriots.⁶¹

Such sentiments evidenced not simply a reappraisal of the natural sciences and their practitioners, but a shift in conceptions of social worth, and changing notions of what qualities deserved to be celebrated and emulated. This shift was, in many ways, a top-down process, encouraged by enlightened ministers anxious to cleanse Spain of vice and idleness. It represented an assault upon ingrained attitudes towards personal honour, the social degradation associated with manual labour and the inheritance of noble status, which had traditionally been founded upon a distinguished lineage, ancient titles and abstention from 'indecent' forms of work.

Symptomatic of this reform process was a series of royal *cédulas* designed to neutralise the noble aversion to manual work. In 1770, Charles III promulgated an ordinance in which he decreed that 'nothing [should] stand in the way of hidalgos supporting their families by engaging in a craft, in order to avoid the disadvantage of their living idle or badly occupied and becoming a charge on society'.⁶² Ten years later, in 1780, the King consolidated this measure with a second ordinance on the same subject. This decree sought to remove the stigma attached to manual labour, enabling financially challenged nobles to contribute to the economy without jeopardising their honorary status. It stipulated explicitly that 'the occupations of

⁶¹ Ponz, *Viaje de España*, p.1725

⁶² Richard Herr, *The Eighteenth-century Revolution in Spain*, Princeton, Princeton University Press, 1958, p.97

tanner, smith, tailor, shoemaker, carpenter and others of this kind [will be] compatible with the rank of nobility', and their practitioners 'eligible for municipal office'.⁶³

A more vociferous – and more brutal – critic of prevailing conceptions of nobility was the artist Francisco de Goya, who exposed a host of vices and perversions in his satirical engravings, *Los Caprichos* (1799). In one plate, 'Asta su abuelo' ('Thus was his grandfather'), a donkey scrutinises his family tree, its mouth hanging open in an idiotic grin and its eye gleaming dementedly. 'This poor animal has been driven mad by Genealogists and Heralds', explains Goya. 'He is not the only one'.⁶⁴ Another plate, entitled 'Ni más ni menos' ('Neither more nor less'), features a second donkey. This animal poses gravely whilst a monkey sketches his portrait. 'He is quite right to have his portrait painted', reads the caption below; 'thus those who do not know him and have not seen him will know who he is'.⁶⁵

In both of these engravings – and others – Goya parodied the parasitic conduct of the upper classes. He satirised a group of individuals who measured their social status according to the pedigree of their ancestors, rather than the sum of their own achievements, and he criticised individuals who wished to perpetuate their image, even when they had accomplished nothing tangible or worthy of commemoration. This rationale differed markedly from the meritocratic reward system proposed by Ponz and other reformers. It was presented by Goya as outmoded and archaic and came, increasingly, to compete with a more modern idea of honour that prized talent and industry over genealogical good fortune.

⁶³ Ibid., p. 126

⁶⁴ Francisco de Goya y Lucientes, *Los Caprichos*, New York, Dover Publications, 1969, Plate 39

⁶⁵ Ibid., Plate 41



Fig.3: Plate 39 - *Asta su abuelo* – *And so was his grandfather*, from *Los Caprichos*, by Francisco Goya y Lucientes, New York, Dover Publications, 1969. The caption opposite reads: ‘A este pobre animal le han vuelto loco los Genialogistas y reyes de Armas. No es el solo’ – ‘This poor animal has been driven mad by Genealogists and Heralds. He’s not the only one’.



Fig.4: Plate 41 - *Ni más ni menos* – *Neither more nor less*, from *Los Caprichos*, by Francisco Goya y Lucientes, New York, Dover Publications, 1969. The caption opposite reads: ‘Hace muy bien en retratarse: así sabrán quien es los que no le conocen ni ayan visto’ – ‘He is quite right to have his portrait painted; thus those who do not know him and have not seen him will know who he is’.

This gradual shift in social values had significant implications for the perception of natural history and its practitioners, who engaged in strenuous physical labour as well as more orthodox scholarly pursuits. ‘The popularity of natural history’, explains Mauricio Nieto, ‘had to do with a series of social practices and political projects surrounding collections, cabinets, exhibitions and gardens, which gave a certain status to their owners’.⁶⁶ Since only the richest stratum of society was in a position to assemble such treasures, it was necessary to convince its members of the benefits of such a pursuit. Advocates of natural history duly couched their polemics in the language of social and national regeneration, assuring Spanish hidalgos that a passion for the natural world would in no way compromise their honour as noblemen and prescribing the study of nature as a wholesome antidote to less salubrious pastimes.

One writer to adopt this posture was the journalist Juan Blasco Negrillo. In an introductory article about the discipline of natural history, published in the periodical *Variedades de Ciencias y Artes* (1804), Negrillo questioned the value of natural history cabinets and asked whether ‘these occupations should not be considered as mere superfluities, suitable only for powerful layabouts’, who aspire simply to flaunt their wealth and ‘acquire at this price the vain reputation of *curioso*?’⁶⁷ Negrillo’s answer was a resounding ‘no’. The collectors of natural history artefacts, were, the journalist contested, ‘far from deserving scorn and the denomination of layabouts’. Natural history was ‘the science most useful and necessary to man, owing to the numerous benefits and commodities with which it provides him’, and it did not merit such misplaced disdain. Negrillo hypothesised, indeed, that its study might deflect the

⁶⁶ Mauricio Nieto, *Remedios para el Imperio: Historia Natural y la Apropiación del Nuevo Mundo*, Bogotá, La Imprenta Nacional de Colombia, 2000, p.15

⁶⁷ Juan Blasco Negrillo, ‘Historia Natural’, Footnote p.37

nobility from other less wholesome diversions. 'It would be desirable', he mused, 'if this useful mania were to become common amongst wealthy persons, and if they were to employ in it the money they squander on gambling, or any other amusement of a similar nature'.⁶⁸

The expression of such views appears to have had a positive effect, for there is certainly evidence that, as the eighteenth century progressed, the study of natural history became an increasingly popular pursuit in Spain, attracting aficionados in high places. The *Memorial Literario* reported in 1784 that Gómez Ortega's botanical lessons at the Real Jardín Botánico were attended not only by the botanist's students, but also by 'several curious individuals and *distinguished persons* of both sexes'.⁶⁹ No less a person than Charles III's brother, Don Luís, was reputed to 'possess a cabinet [of natural history] amongst the rarest [in Europe]',⁷⁰ whilst Don Urbano Severo, writing to the editor of the Madrid periodical *Diario Curioso, Erudito, Económico y Comerical* in 1786, exclaimed that

it delights me to observe how the study of Oriental Languages, of Physics and Natural History, in its different branches, is being propagated amongst us, be it with the creation of precious cabinets, be it with the help of the exquisite translation that has just been published [he was probably referring to José Clavijo Fajardo's recent Spanish translation of Buffon's *Histoire Naturelle*], or be it, finally, by remembering amongst other things the merit of Acosta,

⁶⁸ Ibid., footnote p.37

⁶⁹ 'Real Jardín Botánico', *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, September 1784, Madrid, Imprenta Real, 1784, p.8 (my italics)

⁷⁰ Cavanilles, *Espagne*, p.69

Hernández, Carillo, Monardes and Barba [all sixteenth-century savants], of whom the Nations who today treat us with such ingratitude took advantage.⁷¹

Foreign observers also noted this growing interest in natural history collecting when they visited the Peninsula, as did enlightened Spaniards who charted such developments. The British traveller Joseph Townsend, for example, touring the Iberian Peninsula in the years 1786-1787, inspected the private cabinet of the Marquis of Sonora – the Minister of the Indies José de Galvés - where he marvelled at emeralds ‘superior to any I had seen for lustre and for size’ and examined ‘good specimens of gold and silver’ and ‘artificial birds in filigree from the East Indies, which must give pleasure to all who can admire these works of art’.⁷² The Spaniard Cavanilles, meanwhile, was pleased to encounter several amateur botanists when he visited his native Valencia in 1791. The botanist commented with pleasure on the general taste for sciences in the region. He reserved particular praise for the apothecary Don Juan Antonio Barrera, who had collected more than eight hundred species of plants at his home in Vistabella,⁷³ and the Archbishop of Valencia, Señor Mayoral, who had founded a botanical garden next to his palace where he had succeeded in acclimatising a variety of American species, such as the yucca, the chimoyo and the aguacate.⁷⁴

The eighteenth century also witnessed an assault on scholasticism, as scholars started to champion direct observation and experimentation over inductive reasoning

⁷¹ Urbano Severo, *Carta de Don Urbano Severo a los Diaristas*, Madrid, Imprenta de Andrés Ramírez, 1786, p.1.

⁷² Joseph Townsend, *A Journey Through Spain in the Years 1786 and 1787: With particular attention to the Agriculture, Manufactures, Commerce, Population, Taxes and Revenue of that Country; and Remarks in passing through a part of France*, Vol. I, 3rd Edition, Dublin, 1792, p.182

⁷³ Antonio Josef Cavanilles, *Observaciones sobre la Historia Natural, Geografía, Agricultura, Población y Frutos del Reyno de Valencia*, Madrid, en la Impenta Real, Año de 1795, p.84

⁷⁴ *Ibid.*, p.137

and the accumulated authority of the Ancients, and naturalists in particular emphasised the importance of personal experience in the study of the natural world. To understand nature, they insisted, one had to engage the eyes and the hands, not merely the power of reason. One had to examine nature's productions for oneself, instead of relying on the information one read in books, and, if what one saw with one's eyes diverged from what one read in one's library, then it was the testimony of the eyes that should take precedence.

The Spaniard José Clavijo Fajardo enunciated precisely this view in the prologue to his translation of Buffon's *Histoire Naturelle* (1785). Discussing the multiple benefits offered by natural history cabinets, Clavijo acknowledged that 'books of natural history are very useful and indispensable' for learning about the origin and properties of minerals, but he insisted that 'in order to read them fruitfully, one must first have a knowledge of those same compounds, [one must] handle them, examine them carefully, compare them, note how they resemble one another and how they differ, and accustom oneself as far as possible to distinguishing them at a glance by their configuration, or by means of certain easily manual experiments'. Like the anatomist, who derived his knowledge of the human torso from dissecting bodies, or the pilot of a ship, who refined his navigational skills by traversing the seas, a good naturalist synthesised book learning with practical experience. 'The true knowledge of Natural History can only be acquired by examining and observing nature and familiarising oneself with it', stipulated Clavijo; 'and it is from not having followed this method that some authors have incurred errors that are all the less worthy of indulgence when the objects they were studying were quite common, and they could have examined them without difficulty'.⁷⁵

⁷⁵ Clavijo-Fajardo, *Historia Natural*, Vol. I, p.xviii

The priest José Torrubia expressed a similar view in his *Aparato de la Historia Natural Española* (1754). Torrubia, whose work focused primarily on fossils, announced in the prologue that he had ‘always been suspicious of those authors who...resolve from their studies the most arduous problems of Physics’. He hypothesised that ‘a thousand leagues walked are more instructive than a thousand books read’, and he summoned his own extensive travels and experiments as evidence of his truthfulness and reliability. ‘I will never look in matters of Physics for a reason that does not concur with what I see with my eyes’, vowed Torrubia. ‘I have thumbed a large book in the twenty thousand leagues that I have walked, and I have always occupied myself in the reflective and repeated observation of [nature’s] works, inspecting them with new instruments and continually making experiments in Mechanics, Optics and Anatomy’.⁷⁶ Torrubia’s long journeys in Spain, the Philippines, Mexico and Cuba thus enriched his natural knowledge more than chimerical systems or outdated books.

Of course, the expression of these views and the existence of impressive collections did not mean that the delights of natural history were entirely appreciated or understood by society as a whole, or even, in some cases, by those who compiled them. The fact that Negrillo still felt the need to enumerate the benefits of the discipline in 1804 suggests that not everyone had imbibed the message. Townsend, having admired the contents of Gálvez’s cabinet, maligned its scientific worth, concluding that ‘the Marquis most evidently had no taste for science, and was solicitous not to acquire knowledge, but to encrease [sic] his treasure’,⁷⁷ whilst even

⁷⁶ Joseph Torrubia, *Aparato para la Historia Natural Española*, Madrid, Imprenta de los Herederos de Don Agustín de Gordejuela y Sierra, 1754, Vol I, pp.2-3

⁷⁷ Townsend, *Journey*, p.182

Azara, proud as he was to showcase his passion for zoology, suspected that his works would not receive the credit they deserved in his native Spain. Writing to his French editor Walckenaer in 1805, the Spaniard stated that his study of Paraguay's birds was soon to be published in Madrid, but anticipated that it would generate little interest. 'I do not expect that it will be appreciated', lamented Azara, 'since in this country there is no taste for the sciences, much less for Natural History'.⁷⁸

In spite of such discrepancies, one does nevertheless sense a shift in attitudes in the late eighteenth century that rendered natural history compatible with more traditional conceptions of honour and deserving of recognition. 'We already see, with unspeakable joy, how Mars has been reconciled with Minerva', exclaimed Don Urbano Severo in 1786; 'that the Sword is no longer incompatible with the Toga, nor the state of monk, ecclesiastic, gentleman or labourer with useful and ingenious discoveries'.⁷⁹ This signified a reappraisal of social values. As Sarrailh has commented:

The Spaniards, who had begun by laughing a little at those foreign gentlemen, with their mania for constructing cabinets of physics or mineralogy, of botany or of zoology, came to find some interest in forming their own collections, and started to be convinced that they were as useful as cabinets of medals, and to aspire to compile equally rich cabinets, be it in a pharmacy in Barcelona [like Jaime Salvador] or in a certain palace in Madrid [like Charles III's uncle Don Luís].⁸⁰

⁷⁸ Azara, *Viajes*, Vol. I, p.22

⁷⁹ *Carta de Don Urbano Severo a los Diaristas*, Madrid, Imprenta de Andrés Ramírez, 1786, pp.1-2

⁸⁰ Jean Sarrailh, *La España Ilustrada del a segunda mitad del siglo XVIII*, Mexico-Buenos Aires, Fondo de Cultura Económica, 1957, p.111

Transatlantic Tributes

The vices that Goya mocked in his *Caprichos* were not confined to Spain. Many of them extended to her American colonies, where they often assumed a racial dimension. Stuart Schwartz and Frank Salomon have argued that ‘toward the close of the colonial era in Colombia, “low” urban occupations including surgery and school-teaching were so clearly associated with *mestizaje* that individuals suing to have their purity of blood or nobility ratified “invariably argued as a proof of their social distinction that they ha[d] not done ignoble work” of these types’.⁸¹ Mark Burkholder concurs, citing the testimony of a foreign visitor to Caracas at the end of the colonial era. This individual, having witnessed the results of this honour code first hand and reported that a creole ‘would think himself disgraced to owe his subsistence to the sweat of his brow, or the hardness of his hands’. ‘Nothing, according to him, degrades a man so much as labour’, stated the foreigner, and ‘he believes that it is impossible to preserve one’s dignity and do honour to one’s ancestors except with a pen in the hand, a sword by the side or a breviary under the eyes’.⁸²

A report addressed by the City Council of Caracas to Charles IV in 1796 epitomised this social prejudice. Protesting against a recent royal decree enabling *pardos* (people of mixed European and African ancestry) to ‘buy’ certificates declaring themselves to be legally white, the caraqueño councillors specified that ‘the

⁸¹ Stuart B. Schwartz and Frank Salomon, ‘New Peoples and new kinds of people: adaptation, readjustment and ethnogenesis in South American indigenous societies (colonial era)’, in Frank Salomon and Stuart B. Schwartz (eds.), *The Cambridge History of the Native Peoples of the Americas*, Vol. III, Part 2, Cambridge, Cambridge University Press, 1999, p.492

⁸² Mark Burkholder, ‘Honour and Honours in Colonial Spanish America’, in Lyman L. Johnson and Sonya Lipsett-Rivera (eds.), *Sex, Shame and Violence: The Faces of Honour in Colonial Latin America*, Albuquerque, University of New Mexico Press, 1998, p.26. Juan B. Lastres, conjectures, likewise, that the high proportion of mulattos engaged in surgery in colonial Peru tarnished the status of a profession already perceived as inferior to medicine on account of its substantial manual component. See Juan B. Lastres, *La Cultura Peruana y la Obra de los Médicos en la Emancipación*, Lima, 1954, p.48

pardos and free mulattoes specialise in the mechanical skills, though now many of them despise such occupations and regard it as unseemly to be both a soldier and a shoemaker or a barber, while those with more honest ideas never escape from a low job and a life of poverty'. As a result of this association between African heritage and certain trades, those of pure European ancestry abstained from all manual work, lest they jeopardise their racial superiority. 'A white never takes an artisan's job for fear of being classed with the pardos', stated the report.⁸³

In America too, however, traditional conceptions of nobility were beginning to elicit criticism from more progressive sections of society. The New Granadan Jorge Tadeo Lozano fulminated against lethargic hidalgos in his periodical *El Correo Curioso*, thundering that 'the noble who passes his days in shameful sloth is more vile than the artisan who professes an office, however humble it may be'.⁸⁴ Lozano's compatriot Antonio Zea concurred with this view, urging his compatriots to 'replace philosophical jargon and the wisdom of scholasticism with the *belles lettres* and the exact sciences, that contribute to human happiness',⁸⁵ whilst the Peruvian physician Hipólito Unanue recommended the study of botany to his fellow Americans as conducive to 'the comfort, enlightenment and honest pleasure of man'.⁸⁶

The New Granadan Francisco José de Caldas offered an even more stinging critique of antiquated noble values when he described the upper class creoles in the

⁸³ John Charles Chasteen and James A. Wood (eds.), *Problems in Modern Latin American History*, Wilmington, Scholarly Resources Inc., 2004, p.13

⁸⁴ Jorge Tadeo Lozano, 'Sobre lo útil que sería en este Reino el establecimiento de una Sociedad Económica de Amigos del País', in *Biblioteca Aldeana de Colombia, Periodistas de los Albores de la República (Jorge Tadeo Lozano, Fray Diego Padilla, José María Salazar y Juan García del Río), Selección Samper Ortega de Literatura Colombiana*, Bogotá, Publicaciones del Ministerio de Educación Nacional, Editorial Minerva, S.A., 1936, p.30

⁸⁵ Antonio Zea, 'Los Avisos de Hebéfilo', in José Celestino Mutis, *Flora de la Real Expedición del Nuevo Reino de Granada*, Madrid, Ediciones Cultura Hispánica, 1954, Vol. I, p.99

⁸⁶ José Hipólito Unanue, 'Descripción Científica de las Plantas del Perú' in Jean-Pierre Clément (ed.), *El Mercurio Peruano, 1790-1795*, Vol. II, Frankfurt, Vervuert, 1998, p.112

city of Cuenca, known locally as 'morlacos'. In an article for his periodical, *El Semanario de la Nueva Granada*, Caldas satirised the mentality of this powerful social group, whose 'white' skins gave them *carte blanche* to exploit the rest of the population, and who flaunted their 'nobility' through crude ostentation, futile blood feuds and interminable legal wrangling. The naturalist sneered at a class, 'whose honour lies in ruining whoever does not bend their knee in their presence, in having great riches, in brandishing a sword [and] in affecting an air of Cato in public'.⁸⁷ He lampooned a set of people so litigious that 'they would fight a lawsuit over the wing of a fly',⁸⁸ and he censured the ignorance of the morlacos, who failed to distinguish between trivial and serious matters, and who, in the education of their children, sought merely 'to inspire in them their own preoccupations and deliriums'.⁸⁹ Caldas dismissed the Cuencan nobility as a degenerate and useless sector of society, and he contrasted their dissipation with his own frugal and industrious conduct as a man of science, devoted to his work and imbued with 'a fortunate custom for seclusion and a certain taste for purity'.⁹⁰ He traced a sharp distinction between old and new conceptions of nobility, in which honour competed with virtue, sloth with industry and ignorance with reason.

Caldas also battled valiantly to secure appropriate rewards for those citizens whose researches benefited and honoured their homelands, summoning the same arguments used by Ponz and his Spanish cohorts. Writing to his friend and collaborator, Santiago Pérez Arroyo on 21 March 1802, Caldas voiced his gratitude

⁸⁷ Francisco José de Caldas, 'Viaje al Corazón de Barnuevo, Mayo 1804', in *Obras Completas de Francisco José de Caldas*, Bogotá, Imprenta Nacional, p.492

⁸⁸ *Ibid.*, p.496

⁸⁹ *Ibid.*, p.492

⁹⁰ Letter from Caldas to Mutis, April 21, 1802, in Jeanne Chenu, *Francisco José de Caldas: Un Peregrino de las Ciencias*, Madrid, Hermanos García Noblejas, 1992, p.180

towards Arroyo and his fellow accomplices, Ignacio Pombo and Camilo Torres and promised to immortalise their efforts in a physical form. 'A statue of Pombo, of Santiago, of Camilo', gushed Caldas, 'would be a small recompense, and the best use that could be made of the first metals that our mines produce, of those mines cultivated and brought to perfection by the wisdom and generosity of three illustrious citizens'. The New Granadan aspired to personally 'record the beloved image of three friends in bronze'. He prophesied – echoing Ponz - that the sight of such statues would furnish his fellow countrymen with excellent role models, and perhaps inspire them to achieve similar fame. 'Thus will we leave to posterity three models of wise and generous citizens', Caldas rejoiced optimistically.⁹¹

Like the author of the *Elogio*, Caldas juxtaposed the happy fate of his contemporaries with the oblivion endured by earlier savants. In his *Estado de la Geografia* (1808), the New Granadan denounced the neglect suffered by the quiteño cartographer Pedro Vicente Maldonado, who had mapped much of the region in the 1730s, and he remarked acidly that 'if we know a part of his actions, we owe it to the pen of a foreigner (La Condamine)'. Caldas grumbled that whilst 'the most celebrated academies of Europe have pronounced eulogies to him [Maldonado]...his compatriots scarcely know him'. He exposed the warped social values of the quiteño, who 'toils to pass into posterity the name of a judge who built a street for him, and has forgotten to erect a monument to the greatest man this land has produced', and he scolded his compatriots for this criminal oversight. 'The historical eulogy of this geographer

⁹¹ Letter from Caldas to Santiago Pérez Arroyo, 21 March 1802, in Chenu, *Caldas*, p.164

should certainly occupy the talents of his fellow citizens', Caldas lectured reproachfully.⁹²

Elsewhere in his work Caldas summoned other instances of equally culpable neglect. Traversing the plain of Yaruquí in the environs of Quito, the naturalist scoured the area for signs of the triangulation pyramids constructed by Charles Marie de la Condamine and his colleagues to execute astronomical observations. He scrutinised the locale intensively, but discovered no trace of them. 'The pyramids do not exist', reproved Caldas. 'They perished at the hands of a mad vanity, fanaticism and barbarism' and their remnants were now to be found performing the less distinguished functions of bridges and doorsteps. 'The Indians of Yaruquí and of Puembo trample on the projects of a wise academy', snorted Caldas. 'Could the Hottentot have done more?'⁹³

Not notably better was the fate of a white marble tablet erected by La Condamine in the vicinity of Cuenca to commemorate the achievements of his expedition. Caldas, exploring the region in 1804, was scandalised to observe that 'instead of perpetuating the memory and the results of observations that determined the shape of the earth...it served as a bridge over a ditch, covered with earth and buried'.⁹⁴ The New Granadan, shocked at this neglect, appropriated the unfortunate tablet and transmitted it to Bogotá, where it could receive the appreciation it deserved. 'What a sad fate for the most famous voyage of the eighteenth century', sighed

⁹² Francisco José de Caldas, 'Estado de la Geografía del Virreinato de Santafe de Bogotá, con Relación a la Economía y al Comercio', in *Obras Completas de Francisco José de Caldas*, Bogotá, Imprenta Nacional, 1966, p.195

⁹³ Francisco José de Caldas, 'Memoria sobre el plan de un viaje proyectado de Quito a la América Septentrional, presentada al célebre director de la expedición botánica de la Nueva Granada, don José Celestino Mutis, por Francisco José de Caldas', in *Obras*, p.304

⁹⁴ Francisco José de Caldas, 'Viaje al Corazón de Barnuevo, Mayo 1804', in *Obras Completas*, p.495

Caldas. 'Tablets, inscriptions, pyramids, towers, all that could announce to posterity that these countries served to decide the celebrated question of the shape of the earth, have perished'.⁹⁵ This state of affairs was a grave loss, not only to the forgotten French academicians and their Spanish associates, Jorge Juan and Antonio Ulloa, but also, as this last comment intimates, to the inhabitants of New Granada, whose homeland had provided the backdrop for such critical scientific observations.

A final episode related by Caldas highlighted both the prejudices that the naturalist's work could incite, and, more significantly, how the endorsement of a respected social figure could help to dissipate these prejudices. Botanising in the province of Cuenca in 1804, Caldas recorded how he acquired the support of the city's Bishop, Pedro Fernández de Córdoba, who 'declared himself my protector with enthusiasm'. The Bishop, whom Caldas classed as 'rare amongst those [men] of his estate', not only offered the naturalist his protection, but 'full of zeal for the progress of the sciences, resolved to accompany me'.⁹⁶ The two men scrutinised Cuenca's flora together. The Bishop also assisted Caldas in making astronomical observations.

Caldas expressed his surprise and delight that Fernández de Córdoba should support his studies so fervently. His astonishment was, however, greatly exceeded by that of the local priests when they spotted their superior at work in the field. 'All were amazed to see their ecclesiastic Chief on his knees at the foot of my quarter-circle, taking heights of the sun, and to see him pick up a plant and to observe it with greater attention', stated Caldas. How shocking must such a scene have been 'for men who

⁹⁵ Ibid., p.491. Caldas complained elsewhere that a local Bishop was planning to demolish one of the church towers that had served La Condamine in his astronomical observations and petitioned him to preserve a building 'more precious, more interesting, more famous than the [towers] of Pisa and Seville'. He prized the tower both for its scientific value and for its symbolic significance as a monument for former scholarly endeavours. See Letter from Caldas to José Celestino Mutis, 6 May 1802 in Academia Colombiana de Ciencias Exactas, Físicas y Naturales (ed.), *Cartas de Caldas*, Bogotá, 1979, p.175

⁹⁶ Francisco José de Caldas, 'Viaje al Corazón de Barnuevo, Mayo 1804', in *Obras*, p.478

have never seen Prelates other than surrounded by servants and oozing
circumspection and dignity!

What particularly gratified Caldas was the way in which the Bishop's conduct elevated his own status and enhanced the respectability of his profession. The naturalist recounted how 'the distinction that the Prelate showed towards my person called the attention of others...fix[ing] their gazes upon me, and attract[ing] the same obsequies and attentions'. He meditated upon the influence that the behaviour of a high-ranking clergyman could exert upon the popular perception of the naturalist, and he recorded with relish how the two men were fêted with floral arches upon their entry into the village of Azogues. Reflecting upon the incident, Caldas speculated that 'never was a botanical expedition so honoured', and he contrasted his pleasant experiences in Cuenca with the distinctly less warm reception accorded to the French academicians who visited the city in 1739, when the entire party of savants was greeted with disdain and one of their number succumbed to an assassin's blade. 'What different times from those in which J. de Jussieu, Godin, Bouguer, de la Condamine, Juan, Ulloa and their colleagues were loathed, persecuted, attacked and one of them, M. Seniergues, surgeon to the academicians, publicly murdered by the mob of Cuenca, incited by the very person [the Bishop] who should have contained it!' exclaimed Caldas. 'What a difference a leader can make!'⁹⁷

Conclusion

Spain's engagement with the natural sciences was predominantly utilitarian in nature, concentrating upon those areas of study that offered tangible practical benefits. The Spanish Crown patronised scientific institutions and expeditions in order to inventory,

⁹⁷ Ibid., p.179

investigate and more effectively exploit the botanical, zoological and mineral riches of its sprawling empire. It was also highly sensitive to the charges of fanaticism and ignorance levelled at Spain by European rivals and it sought to dissipate these allegations by embracing this modern, fashionable pursuit. As Arthur Steele concludes 'it would seem that Spain, determined to promote the sciences and having such vast understudied domains, drifted into herborization because, together with metallurgy, it was the most obvious and readily available type of scientific activity upon which to lavish official funds'.⁹⁸

As the eighteenth century progressed, observation and experiment gradually supplanted the inductive reasoning associated with scholasticism. The ingrained prejudices towards manual labour slowly subsided, both in Spain and its American colonies, and enlightened ministers, authors and scholars advocated a revised social pecking order, in which personal merit outweighed genealogical pedigree and virtue superseded honour as a measure of social merit.

The naturalist slotted well into this emerging (theoretically) meritocratic framework, personifying this new, useful breed of individuals, and he went from being disdained and neglected to being celebrated and rewarded.⁹⁹ Statues were erected in his honour – something that contemporaries recognised as a novelty. Wealthy Spaniards, reassured that an interest in botany would not jeopardise their noble status, began to collect natural objects alongside medals and antiquities, and reform-minded individuals identified naturalists as suitable models for emulation. A

⁹⁸ Arthur Steele, *Flowers for the King: The Expedition of Ruiz and Pavón and the Flora of Peru*, Durham, Duke University Press, 1964, p.49

⁹⁹ Antonio Lafuente characterises the naturalist as an individual 'whose social rise was based on talent rather than lineage, and who derived the usefulness of knowledge from its quantifiability'. See Antonio Lafuente, 'Enlightenment in an Imperial Context: Local Science in the Late-Eighteenth-Century Hispanic World', *Osiris*, 2nd Series, Vol.15, 2000, p.171

jubilant Cavanilles rejoiced in 1804 that budding savants ‘see everywhere models worthy of imitation’, whilst Ponz’s scheme for commemorating recently deceased savants was in part realised in 1808, when Claudio Boutelou began giving classes at the Real Jardín Botánico as professor of agriculture. According to the New Granadan Sinforoso Mutis, ‘Fernando VII, in the few days that he governed the monarchy for himself, and at a time of great uncertainty, had the portrait of [the botanist José Celestino Mutis] placed alongside that of Don Antonio Cavanilles in the Real Jardín Botánico, so that they might serve to stimulate the younger generation’, thus enacting the art critic’s belief that worthy models would spawn diligent disciples.¹⁰⁰

¹⁰⁰ ‘Historia de los Arboles de Quina. Obra Póstuma de D. José Celestino Mutis, célebre naturalista y patriarca de los Botánicos, Director de la Real Expedición del Nuevo Reino de Granada, Socio de diferentes Academias de Europa Astrónomo de S.M. Concluida y arreglada por D. Sinforoso Mutis y Consuegra, Individuo de la misma Real Expedición Botánica, y nombrado para organizar y publicar la Flora de Bogotá’, 1809, in Mutis, *Flora*, Vol. I, p.112

Chapter 2 - Sloth bones and Kangaroo Teeth: Gathering Nature's Wonders

On 30 December 1775, King Charles III of Spain visited the Real Gabinete de Historia Natural in the company of his uncle, Prince Luís. The Real Gabinete, the latest addition to Madrid's intellectual landscape, was not due to open formally until November 4, 1776.¹ The King was granted a privileged sneak preview of the institution, in the establishment of which he had been instrumental. He declared himself suitably impressed by the marvels exhibited within.

Charles was, in fact, more than impressed. He was moved. Sufficiently moved, it transpired, to consign his experiences to poetry. Writing to 'a poet friend of his, resident in Madrid', Charles narrated his impressions of the institution.² In verse, the King described the beautiful mahogany shelves that adorned each room. He eulogised the wonders on display in the Sala de Minerales, where the sight of so many rare 'sands, stones, salts, petrifications and metals', 'suspended both the eyes and the spirit'.³ He detailed the contents of the Sala Botánica, filled with 'seeds, grains and flowers...resins, balsams and rubbers', and he devoted particular attention to the treasures of the animal kingdom, whose productions were to be seen perched on shelves or suspended in alcohol.⁴ The 'thousand birds with capricious feathers', the 'admirable amphibians and fish' and the 'quadrupeds, placed in different postures and conserved by art as if alive' all enchanted the King,⁵ whilst even the 'monsters and

¹ Antonio Ponz, *Viaje de España, Seguido de los dos Tomos del Viaje Fuera de España*, Madrid, M. Aguilar, 1947, p.487

² *Ibid.*, p.513

³ *Ibid.*, p.515

⁴ *Ibid.*, p. 515

⁵ *Ibid.*, p. 515

skeletons' intrigued him, revealing as they were of the mysterious caprices of their 'celestial Author'.⁶ The human artefacts that filled the final room in the Gabinete proved no less fascinating, and Charles concluded his reminiscences by describing 'the costumes, the furniture and the armaments of [people from] other climates...and other ages' that had awaited him in this room, along with an assortment of medals, vases and bronzes.⁷ If his poetic efforts are to be believed, the King departed the Real Gabinete enraptured, enlightened and quite overwhelmed.

Charles also departed the Gabinete brimming with personal and patriotic pride. If the admirable contents on display signified God's creativity and power, they also symbolised the power and extension of the Spanish monarchy, constituting tangible proof of vast domains blessed with abundant natural resources and of efficient systems of government able to procure these treasures, facts of which Charles himself was well aware. The museum of natural history, Charles stated in his poem, was a place 'wherein shines the power and wealth of a nation ruler of two worlds' – a clear allusion to Spain's American possessions.⁸ The impressive collection of minerals on display was 'the accumulation of that which Spain produces in her maternal entrails' – a reference, presumably, to the nation's mineral wealth – and the institution as a whole resembled 'a book in which you read about who you are and the many things you possess'.⁹ Whilst this last remark could be interpreted as a metaphor for personal enlightenment and religious deference, as visitors ruminated over their place in the natural world and the vastness of God's bounty, it appears, in

⁶ Ibid., p. 515

⁷ Ibid., p.516

⁸ Ibid., p.514

⁹ Ibid., p.515

the case of its author, to merit a more literal interpretation. Charles III and his ministers had played a critical role in founding the Gabinete. Visitors to the institution could thus legitimately associate the natural wealth contained within with the breadth of Charles' imperial possessions and the enlightened mentality of his government. They could view the Real Gabinete as a microcosm of Spain's global power.

This chapter examines how Spain harnessed the riches of her vast empire to enrich the Real Gabinete and its counterpart the Real Jardín Botánico. In the previous chapter, we assessed the concerns, both patriotic and utilitarian, that motivated the foundation of these institutions, and charted changing attitudes towards the natural sciences. We now move on to address the 'how?' element in the Spanish natural history project. We explore some of the mechanisms through which the Director of the Gabinete, Pedro Franco Dávila, and his botanical counterpart, Casimiro Gómez-Ortega, collected the specimens they desired - ranging from formal scientific expeditions to governmental decrees, and we emphasise how collecting practices were shaped by existing – and changing - imperial structures.

Writing in 1784 in response to Nicolas Masson de Morvillier's unflattering *Encyclopédie* article 'Espagne', the disgruntled Spanish botanist Antonio Josef Cavanilles asserted, with patriotic pride, that 'it had not cost more than the order of a minister to complete [the] superb collection [at the Gabinete Real]'.¹⁰ Pedro Franco Dávila exuded similar confidence in the institution's future in 1773, when, formulating an architectural plan for the proposed natural history cabinet, he stipulated that 'a large room' should be assigned to the display of the mineral kingdom. 'The Cabinet of his Imperial Majesty in Vienna has a room of 60 French feet in length and 40 in width destined for these collections alone', stated Dávila, 'and

¹⁰ Cavanilles, *Espagne*, p.69

we can expect to have much more in this genre on account of what they will send us from the Americas'.¹¹ Both Cavanilles and Dávila thus prophesied that it would be relatively easy to stock the exquisite mahogany shelves of the Gabinete, thanks to the zeal of ministers and the obedience of subjects.

The truth, of course, was rather more complex. Zealous officials certainly played a critical role in the acquisition of specimens, both botanical and zoological, and Spain's vast and long-established American territories undoubtedly gave her an advantage over some of her European rivals. Collecting natural history artefacts, however, was not easy. Live plants and animals could expire in the course of transportation. Dead ones could decay, whilst poor or non-existent labelling could render specimens useless or unidentifiable. More drastically, valuable specimens could succumb to the attacks of foreign powers, ships carrying natural treasures could sink and naturalists could perish. The Spaniard Félix de Azara, for example, attempted to bring the cones of a certain pine tree back to Spain, believing its wood to be good for making ships' masts, but found his scheme thwarted when 'the Portuguese despoiled me of them, as of other seeds and of all my luggage'.¹² The *San Pedro de Alcántara* meanwhile, sank in 1783, taking Hipólito Ruíz's collection of *Araucaria* pines and other Chilean botanical treasures to the bottom of the ocean.¹³

As the above examples illustrate, successful collecting required scrupulous care, clear instructions, co-operative naval personnel and a substantial dose of luck.

The chapter examines some of the measures taken by the Spanish government to

¹¹ María de los Angeles Catalayud, 'El Real Gabinete de Historia Natural', in Antonio Lafuente, José Peset, José, and Manuel Sellés (eds.), *Carlos III y la Ciencia de la Ilustración*, Madrid, Alianza Editorial, 1988, p.220

¹² Félix de Azara, *Viajes por la América del Sur desde 1789 hasta 1801*, Montevideo, Comercio del Plata, 1846, p.60

¹³ Steele, *Flowers for the King*, p.119

improve the odds of successful remittances of specimens. It also argues that the collection of natural history artefacts reflected Spain's shifting imperial status, since the ability to obtain particular specimens was closely connected to the extension of Spain's overseas possessions and to its relations with other European powers. When the Frenchman Jean François de Bourgoing praised the Real Gabinete for containing 'one of the compleatest [sic] collections in Europe in metals, minerals, marble, precious stones, corals, madrepores and marine plants', he was tacitly acknowledging Spain's vast dominions and imperial might.¹⁴ When, conversely, Juan Mieg bemoaned the absence of a kangaroo and a platypus from the museum's shelves in 1818 – examples of which could be seen in London and Paris – he was pointing, covertly, to Spain's imperial decline, at a time when the country had been a victim of Napoleonic invasion and its American colonies were in the throes of independence. The ability to stock the Jardín Botánico and the Real Gabinete thus mirrored the reform and contraction of the Spanish empire. This chapter explores this relationship.

Collecting and Empire

The relationship between empire and collecting has recently become a key theme in European cultural history. Several historians have signalled the role of gardens, museums, zoos and private cabinets of curiosity as sites for the exhibition of personal and imperial power. They have situated these institutions in a wider context of global exploration and colonialism.

In her work *Edge of Empire* Maya Jasanoff examines collecting in India and Egypt in the late eighteenth and early nineteenth centuries. The collectors profiled by Jasanoff were primarily British and French – or at least in the service of these states –

¹⁴ Jean-François Bourgoing, *Travels in Spain: Containing a New, Accurate and Comprehensive View of the State of that Country down to the year 1806*, London, J.G. Barnard, 1808, p.103

and specialised in the acquisition of antiquities. Jasanoff uses the extracurricular activities of men such as Antoine Pollier, Benoit de Boigne and Giambattista Belzoni to reappraise the imperial projects of Britain and France. She argues that the collection of exotica – be it rare plants, Egyptian monuments or mechanical tigers – was intimately connected to the process of colonial expansion. She also suggests that collecting could constitute the terrain upon which national power was contested, with the collection of objects to some extent mirroring the ‘collection’ of territories.¹⁵

Jasanoff’s collectors prioritised the acquisition of antiquities. The collection of natural treasures, however, was likewise related to – and constrained by – the wider European imperial project. Indeed, it may be in some ways rather artificial to separate these two forms of collecting, since many individuals dabbled in both. The Frenchman Claude Martin assembled both natural and man-made objects in Lucknow, whilst the British Museum displayed an array of exotica, much of it collected by John Sloan in Jamaica. Antonio Ponz, who scrutinised the Museum’s content in 1783, indicated the varied nature of its contents. ‘There are copious collections of books, printed and handwritten, of medals, old and modern and all types of Egyptian, Roman, Etruscan, American and Asian curiosities’, wrote Ponz. There was also a ‘considerable’ collection of ‘natural curiosities’, which consisted of ‘birds, quadrupeds, fish, metals, stones and plants’, and the skeleton of a whale suspended above the main staircase.¹⁶ The breadth and extent of the items of display attested the diligence and the wide interests of Sloan and his fellow collectors.

Richard Drayton and Emma Spary have focused more specifically upon the relationship between natural history and empire. In *Nature’s Government*, Drayton

¹⁵ Maya Jasanoff, *Edge of Empire: Conquest and Collecting in the East, 1750-1850*, London, Fourth Estate, 2005, passim

¹⁶ Ponz, *Viaje de España*, p.1817

charts the evolution of Kew Gardens in London, showing how Sir Joseph Banks transformed this institution into the 'great exchange house of empire'.¹⁷ He argues that Banks presided over a botanical empire, which sought to 'improve' British commerce and agriculture by supervising the transplantation of species across the British Empire. He mentions, for instance, the introduction of the Polynesian breadfruit plant to the West Indies, where it was supposed to provide food for slaves.

Spary studies the development of the Jardin du Roi in Paris in her work *Utopia's Garden*. In her second chapter, 'Acting at a Distance', Spary addresses the process of gathering specimens and suggests that André Thouin, head gardener of the Jardin (1764-1793) exploited a sprawling network of correspondents to acquire seeds and plants. This network – which included the director of the Madrid botanical garden, Casimiro Gómez-Ortega, and the French component of the botanical expedition to Peru and Chile (1777-88), Joseph Dombey – extended throughout Europe, and, thanks to travelling naturalists, diplomats and merchants, around the world, furnishing Thouin with seeds from such diverse areas as Siberia, Montevideo and Botany Bay. Spary suspects that 'Thouin's activities were probably representative of developments at all major botanical centres in Europe and the colonies in the later eighteenth century', a supposition that this chapter will consider with reference to Spain.¹⁸

¹⁷ Richard Drayton, *Nature's Government: Science, Imperial Britain and the 'Improvement' of the World*, New Haven and London, Yale University Press, 2000 p.108

¹⁸ Emma Spary, *Utopia's Garden: French Natural History from Old Regime to Revolution*, Chicago and London, University of Chicago Press, 2000, See chapter 2, 'Acting at a Distance', pp.49-98

Royal Remittances

The Real Gabinete was founded in 1771, when Pedro Franco Dávila, a native of Guayaquil and long time resident of Paris, sold his extensive private natural history collection to the Spanish Crown, on condition that he be appointed the new institution's director.¹⁹ Whilst Dávila's contribution was fundamental, the Gabinete also owed a considerable proportion of its exhibits directly to the generosity of its royal patrons. Kings and Princes had traditionally constituted major collectors of *exotica*, both natural and man-made, and rulers such as Francesco I, Grand Duke of Tuscany (1569-1587) hoarded all manner of natural wonders as a testament to their power, good taste and education.²⁰

In the Renaissance period, princely collections were often private affairs, to which only a few privileged individuals were granted access. By the end of the eighteenth century, however, this situation was starting to change. Princes began to expose their collections to public view, and, as Paula Findlen comments, 'enlightened rulers such as the Empress María Theresa and the Archduke Peter Leopold made their collections of art and science accessible to their subjects through the opening of the Brera Museum in Milan in 1773 and through the donation of the Cabinet of Physics and Natural History in Florence in 1775 and the Uffizi galleries in 1789'.²¹ Charles III's efforts to found a Gabinete de Historia Natural in Madrid need to be viewed against this backdrop. As the King himself pointed out, 'It was he who protected [the

¹⁹ Catalayud, 'El Real Gabinete de Historia Natural', p.226-227

²⁰ Paula Findlen, *Possessing Nature: Museums, Collecting and Scientific Culture in Early Modern Italy*, Los Angeles and London, University of California Press, 1994, pp.113-114

²¹ *Ibid.*, p.395

institution] with his royal donations, and it is from him that the natural sciences may expect yet greater glory and ornament'.²²

Several contemporaries bore witness to Charles' generosity towards the Gabinete. José Clavijo-Fajardo, the institution's vice-director, recorded how the King, 'with charitable hand, gave for the formation of the Real Gabinete not only all that which had been collected in the realm of Natural History in the time of his beloved Brother [Fernando VI], but also all of those precious things related to the same History that had come into his Royal hands, be it in grains of gold of an extraordinary size, in samples from silver mines of a singular richness, or in a great number of precious and exquisite vases'.²³ Antonio Ponz noted likewise that 'to the collection that don Pedro Dávila brought from Paris have been added the treasures that the king and the prince [of Asturias] had',²⁴ whilst Cavanilles declared the cabinet of the Infante Don Luís to be 'among the rarest' in Europe.²⁵

The ability of the Spanish Crown to acquire coveted treasures needs to be situated within the wider field of dynastic politics and diplomatic relations. As Louise Robbins has noted, rare beasts and exquisite artworks were often exchanged as diplomatic gifts to reinforce changing foreign alliances. Thus Louis XV received France's first ever zebra in 1760 'as a gift from the Dutch governor of the Cape of Good Hope',²⁶ whilst Louis's predecessor, Louis XIV, was the proud recipient of an African elephant. A Spanish pamphlet written in 1773 recorded that 'this Elephant

²² Ponz, *Viaje de España*, p.516

²³ Clavijo Fajardo, *Historia Natural*, p.xi

²⁴ Ponz, Antonio, *Viaje de España*, p.487

²⁵ Cavanilles, *Espagne*, p.69

²⁶ Louise E. Robbins, *Elephant Slaves and Pampered Parrots: Exotic Animals in Eighteenth-Century Paris*, Baltimore and London, The John Hopkins University Press, 2002, p.4

was from the Kingdom of Congo and was sent to his Christian Majesty in 1668 by the King of Portugal'.²⁷

In addition to cementing peaceful relations between states, animals could also form part of the booty of war. When the British vanquished Tipu Sultan in Seringapatam in 1799, they appropriated not only the Indian ruler's famous mechanical tiger – which, upon activation, mauled a prostrate European soldier whilst emitting a suitably sanguinary growl – but also the living tigers in the Sultan's menagerie. This assemblage of creatures included 'tigers, lynxes, a panther, a mandrill and several birds'. It was purchased by a Mr. Pentland, before being sold on to Delaunay, director of the menagerie and the Jardin des Plantes.²⁸

Napoleon's invasion of Holland was likewise followed by the plundering of the Stadholder's natural history cabinet. Shortly after the Dutch capitulated, the botanist André Thouin was dispatched to Amsterdam to select the most desirable specimens, the provenance of which he planned to publicise upon their arrival in Paris, 'so as to render justice to the valour of the French armies and to perpetuate the memory of their victory'.²⁹ The most prized beasts on offer in Holland were two elephants by the names of Hans and Marguerite, which were 'conveyed to France with infinite expense and labour', where they were 'admired daily in the Museum of Natural History during the various years that they lived there'.³⁰

²⁷ *Descripción del Elefante, de su Alimento, Costumbres, Enemigos e Instinto y Explicación del Uso que se Hace de los Elefantes, Modo de Cazarlos y Utilidades de sus Colmillos en la Medicina y en los Artes etc. Sacado de varios autores de Historia Natural y añadida una noticia circunstanciada del que se ha remitido de Philipinas para el Rey nuestro Señor, Madrid, 1773, p.6*

²⁸ Robbins, *Elephant Slaves and Pampered Parrots*, p.226

²⁹ *Ibid.*, p.225

³⁰ Juan Mieg, *Paseo*, p. 473

The evidence suggests that Charles III and his predecessors benefited in like manner from diplomatic offerings. Amongst the ‘Animals and Monsters’ illustrated by the Gabinete’s dissector Juan Bautista Bru in 1784 were a male and female tapir. According to Bru, these animals ‘came alive from Portugal as gifts for the King, and were in the Casa de Fieras of the Buen Retiro [palace], where they lived some time feeding on grains’.³¹ When the grain-gobbling tapirs expired, they were dissected, stuffed and exhibited in the Gabinete for the inspection and instruction of the public. They shared their fate with the elephant, bestowed upon the Spanish Governor in Manila Don Antonio Anda y Salazar by the Nabob of Indonesia, the skeleton and cadaver of which could be seen in the Sala Botánica, the only room large enough to house it.³²

Another contemporary to highlight the rewards of royal diplomacy was Antonio Ponz. The Spaniard bemoaned the failure to establish a natural history cabinet in Madrid at an earlier date, judging the absence of a Gabinete prior to 1776 to offer ‘an unfavourable idea of our industry and application in the sciences and useful arts’. This state of affairs was, in Ponz’s view, all the more ‘reprehensible’, given that ‘by having merely assembled in a single place, albeit it without system or order, the rarities and exquisite things that in more than two and a half centuries *have been presented* to our kings, we could have had a marvellous collection’.³³

If diplomacy could thus furnish coveted natural treasures, then fortunate dynastic alliances similarly embellished the Gabinete’s collections. In 1818, Juan

³¹ Juan Bautista Bru, *Colección de láminas que representan los animales y monstruos del Real Gabinete de Historia Natural de Madrid, con una descripción de cada uno*, Madrid, Andrés de Sotos, 1786, Vol. II, p.4

³² *Descripción del Elefante*, p.31

³³ Ponz, *Viaje de España*, p.487 (my italics)

Mieg scrutinised some 'beautiful butterflies from America and China, which this Real Gabinete owes in part to the munificence of our august and beloved Queen'.³⁴ Mieg did not specify which of Ferdinand VII's wives had donated these charming insects to the museum (the monarch worked his way through four), but the most likely candidate, however, was Ferdinand's second spouse, Isabel of Braganza, whose Portuguese connections may have furnished her with access to the riches of Brazil. Rare creatures – the spoils of war and the fruits of peace – were thus a form of currency in a wider diplomatic game (as, indeed, were royal princesses) and their donation to the Real Gabinete symbolised a monarch's benevolence and erudition.

Sea Borne Savants

Royal treasures supplied the Real Gabinete with many valuable exhibits. Yet they alone were not sufficient to complete the institution's collections. The specimens donated to Charles III and his relatives by foreign princes were, by their very nature, unsystematic and haphazard in their acquisition, and could not constitute the comprehensive coverage of the natural world to which the Gabinete's directors aspired. Moreover, the gifts received by the monarchy were intrinsically biased towards the rare and the beautiful, and against that which was common or visually unspectacular. The King of Portugal was, for instance, more likely to present his Spanish counterpart with a tapir or a jaguar than with a worm or a beetle. Whilst this discrimination was doubtless pleasing to the royal eye, it did not satisfy the naturalist, who wished to study nature in all its forms. As the Gabinete's director Pedro Franco Dávila stipulated in his *Instrucción*, Charles III's subjects should send the Gabinete 'as many animals as they can find, big and small, of all genus, species and varieties,

³⁴ Mieg, *Paseo*, p. 188

without considering whether they be ugly or beautiful, since in a museum that must contain all natural productions, the commonest stone has its place as much as the richest diamond'.³⁵

In order to acquire these elusive specimens, the Crown had to resort to more direct methods. Firstly, it subsidised several scientific expeditions to its territories overseas. Secondly, it petitioned colonial officials to remit coveted items to the Gabinete.

Over the course of the eighteenth century, the Spanish government choreographed several scientific expeditions. These voyages constituted part of a wider European programme of exploration. They were to some extent a response to, and an extension of, the expeditions of Cook, Bougainville and La Pérouse, though their focus differed in some respects from that of these explorers, as a result of Spain's contrasting imperial position. As José Luís Martínez Sanz has observed, whereas 'France and England went to sea in search of new lands to possess, ... Spain did so in order to know better and with greater precision the lands it already possessed'.³⁶ The Spanish expeditions were designed to discover new and useful natural products rather than uncharted Pacific islands. They were also calculated to consolidate Spain's hold over its existing territories – particularly those on the north-Pacific coast of America, which were then contested by the British, the French and the Russians.

³⁵ Pedro Franco Dávila, *Instrucción hecha de orden del Rey N.S. para que los Virreyes, Gobernadores, Corregidores, Alcaldes Mayores e Intendentes de Provincias en todos los Dominios de S.M. puedan hacer escoger, preparar y enviar a Madrid todas las producciones curiosas de Naturaleza que se encontraren en las Tierras y Pueblos de sus distritos, a fin de que se coloquen en el Real Gabinete de Historia Natural que S.M. ha establecido en esta Corte para beneficio e instrucción pública*, Madrid, Imprenta Real, 1776, p.4

³⁶ José Luís Martíncz Sanz, *Relaciones Científicas entre España y América*, Madrid, Editorial Mapfre, 1992, p. 231

Owing to their concern with the natural world, the Spanish expeditions included personnel trained in the natural sciences to classify and analyse natural specimens and skilled artists to draw them. In this they followed the example of Cook, who enlisted the services of the botanists Joseph Banks, Daniel Solander and the two Forsters and the artistic talents of Sydney Parkinson. The nineteenth-century circumnavigator, Dumont d'Urville, later emphasised the contribution of these individuals to Cook's expeditions. 'One must avow', he stated, 'that the observations in every genre of these wise naturalists have constituted the principal merit and assured the brilliant success of the beautiful publications that made known the voyages of Cook'.³⁷ The Spanish hoped for similar achievements from their travelling savants.

The Spanish scientific expeditions took a variety of forms. Some were choreographed by the Spanish crown alone, others in collaboration with other states - namely France and Portugal. Some prioritised the study of natural history, whilst others encompassed wider political concerns, such as the delineation of frontiers or the resolution of territorial disputes. Some covered vast swathes of the globe, whereas others confined themselves to a (relatively) limited area. Fermín del Pino and Angel Guirao identify four key types of expedition in their article 'Expediciones Ilustradas y Estado Español'; firstly, state sponsored expeditions initiated outside of Spain; secondly, state sponsored expeditions initiated at a national level; thirdly, state sponsored expeditions initiated on a multi-national level and fourthly, privately funded expeditions initiated at a national and international level. Del Pino and Guirao also draw a distinction between expeditions whose focus was primarily botanical,

³⁷ Dumont D'Urville, *Voyage Autour du Monde*, Paris, Furne et Compagnie, 1848, p.iv

expeditions concerned with defining geographical frontiers and expeditions that circumnavigated the globe.³⁸

The first Spaniards to engage in a scientific expedition were Jorge Juan and Antonio Ulloa, who participated in Charles Marie de la Condamine's voyage to Ecuador (1735-1744), where the Frenchman was to measure the meridian at the equator and resolve the current dispute as to the true shape of the earth. This voyage was followed in 1754 by that of Linnaeus' pupil, Peter Loeffling, to the Orinoco basin. The Swede was recruited to examine the local fauna and flora whilst the expedition's chief, Iturriaga, delineated the disputed frontier with Brazil, though he unfortunately succumbed to the tropical climate before he could complete his work.

Spain's engagement with scientific expeditions reached its zenith in the final three decades of the eighteenth century. Between 1777 and 1788, the Spanish botanists Hipólito Ruíz and José Pavón explored Peru and Chile in the company of the French botanist Joseph Dombey, classifying and preserving local flora and fauna, and paying particular attention to those plants that had a medicinal or commercial value, such as quinine. 1783 saw the beginning of Celestino Mutis' botanical survey of New Granada, with the support of the Viceroy Archbishop Caballero y Góngora, and the assistance of creole savants such as the astronomer/botanist Francisco José de Caldas, the artist Francisco Javier Matis and the botanist Francisco Antonio Zea. The Spaniard Martín Sessé, meanwhile, conducted an expedition to New Spain between 1789 and 1795, accompanied by the botanist Vicente Cervantes, the naturalist and dissector, José Longinos, the pharmacists Jaime Senseve and Juan del Castillo and several artists. Sessé's group was later joined by two Mexican botanists, José Mariano Mociño and José Maldonado. Other smaller expeditions in the 1790s included the

³⁸ Angel Guirao and Fermín del Pino, 'Expediciones Ilustradas y Estado Español', *Revista de Indias*, Vol 47, 1987 p.397

mineralogical voyage of the brothers Christian and Conrad Heuland to Chile and Peru (1795-1800), the voyage led by the Conde de Mopox y Jarauco to the Caribbean (1796-1802) and the botanical studies of Juan de Cuéllar in the Philippines.

The two final, and perhaps most ambitious, expeditions were those of Alessandro Malaspina (1790-1795) and Alexander von Humboldt (1799-1804). Malaspina's voyage aboard the *Descubierta* and the *Atrevida* incorporated the Río de la Plata, Chile, Peru, New Spain, the north-west coast of America – where the navigator was to search for the mythical Northwest Passage – the Philippines, Australia and several Pacific islands. It was charged with resolving territorial disputes in the Falklands and at Nootka Sound, and included the naturalists Antonio Pineda, Luís Née and Tadeo Haenke. Pineda, the chief naturalist, scrutinised 'the human species, considered in every one of the different climates through which he passed'. Along with Née and Haenke, he also studied 'the animal and vegetable Kingdom, making a great number of collections and observations'.³⁹

Humboldt executed his celebrated voyage in the company of the French botanist Aimé Bonpland and, in its latter stages, the quiteño Carlos Montúfar. The Prussian's expedition was self-financed, though conducted with the permission of the Spanish Crown. It signalled a change in emphasis in the domain of scientific travel, for, unlike previous naturalists, Humboldt sought to decipher the relationship between natural phenomena rather than merely to classify them according to the Linnaean system. As Michael Dettalbach has argued, the Prussian aspired to replace the *botaniste nomenclateur* with the *botaniste physicien*, synthesising facts, instead of

³⁹ Unanue, *Elogio Histórico del Señor Don Antonio de Pineda*, p.8

presenting them in isolation.⁴⁰ The Prussian's pioneering approach, coupled with his exhaustive researches and copious publications, made his expedition a landmark in the history of science and elicited much praise from contemporaries, both European and American. The French naturalist Alcide Dessalines d'Orbigny eulogised Humboldt's expedition as a 'model voyage...long meditated and executed on such a grand scale for the sciences it embraced; geography, based on astronomical observations, geology, botany, the different branches of zoology, the history of peoples, their ethnology, etc'.⁴¹ The Uruguayan, Dámaso Antonio Larrañaga, offered similarly effusive praise. Writing to Bonpland, who had returned to America in 1816 (see chapter 5), Larrañaga explained that he had baptised two 'extraordinary cetaceans' in honour of the Prussian and the Frenchman. He beseeched Bonpland to accept this 'small homage, which we attribute to you in the name of a grateful America, who will never know how to repay the labours and copious knowledge that you have diffused throughout our Continent'.⁴²

The Spanish scientific expeditions of the eighteenth-century have received fairly extensive historiographical coverage.⁴³ The point that merits emphasis here,

⁴⁰ Michael Dettlback, 'Global Physics and aesthetic empire: Humboldt's physical portrait of the tropics', in *Visions of Empire: Voyages, Botany and Representations of Nature*, Miller, David Philip, and Reill, Peter Hanns (eds.), Cambridge, Cambridge University Press, 1996, p.267

⁴¹ Alcides Dessalines D'Orbigny, *Voyage Pittoresque dans les Deux Amériques*, Paris, L. Tenré and H. Dupuy, 1836, p.xi

⁴² Dámaso Antonio Larrañaga, *Escritos de Don Dámaso Antonio Larrañaga*, (ed. Alejandro Gallinal, Montevideo), Instituto Histórico y Geográfico del Uruguay, Imprenta Nacional, 1922, Vol. III, p.269

⁴³ On the Ruiz and Pavón expedition, see Arthur Steele, *Flowers for the King: The Expedition of Ruiz and Pavón and the Flora of Peru*, Duke University Press, Durham, North Carolina, 1964. On Sessé and Mociño, see Juan Carlos Arias Divito, *Las Expediciones Científicas Españolas durante el siglo xviii: Expedición Botánica de Nueva España*, Madrid, 1968. On Mutis, see José Luis Peset, *Ciencia y Libertad: El Papel del Científico ante la Independencia Americana*, Madrid, Consejo Superior de Investigaciones, Madrid, 1987. On Humboldt see Charles Minguet, *Alexandre de Humboldt: Historien et Géographe de L'Amérique Espagnole (1799-1804)*, Paris, Éditions L'Harmattan, 1997. For syntheses of Spanish expeditions to the Americas, see Iris H. W. Engstand, *Spanish Scientists in the New World: The Eighteenth-Century Expeditions*, Seattle and London, University of Washington Press, 1981; Juan Pimental, *Jorge Juan, Mutis, Malaspina: Viajeros Científicos, Tres Grandes Expediciones al Nuevo Mundo*, Novatores, Madrid, 2001; José Luis Martínez Sanz, *Relaciones Científicas entre*

however, is how these expeditions contributed to the riches of the Real Gabinete and the Real Jardín Botánico, and the degree to which the specimen gathering process was conceived as one of their primary duties. The evidence suggests that the collection of seeds, plants, animals and ethnological artefacts was indeed given high priority in the major overseas expeditions. When Charles III sanctioned the botanical expedition to Peru and Chile, he explicitly instructed Ruíz and Pavón 'to form herbaria and collections of the products of nature, describing and making drawings of the plants found in these, my fertile domains, in order to enrich my Museum of Natural History and the Botanical Garden of the Court'.⁴⁴ Martín Sessé and his companions in New Spain were likewise ordered 'to collect, describe, draw and illuminate all of the natural productions of that Kingdom, especially those described by [the sixteenth-century naturalist Francisco] Hernández',⁴⁵ whilst the botanist Vicente Cervantes was also charged with establishing a botanical garden and natural history cabinet in Mexico City, to further the study of nature in the viceroyalty and to facilitate exchanges of specimens with Madrid. José Longinos, another of Sessé's party, founded a natural history cabinet in Guatemala City.

In spite of mishaps such as the sinking of the *San Pedro Alcántara* and the unfortunate death of Antonio Pineda, the scientific expeditions furnished the Real Gabinete and the Real Jardín with some important specimens. According to Carlos Arias Divito, Sessé departed New Spain with 3,500 plants in his herbarium, at least 2,500 of which were unknown in Europe, drawings and descriptions of 500 birds and

España y América, Madrid, Editorial Mapfre, 1992; and Francisco Javier Puerto Sarmiento, *La Ilusión Quebrada: Botánica, sanidad y política científica en la España Ilustrada*, Madrid, Consejo Superior de Investigaciones Científicas, 1988.

⁴⁴ Steele, *Flowers for the King*, p. 58

⁴⁵ *Noticia del descubrimiento de e impresión de los mss. de Historia natural de Nueva España del Dóctor Francisco Hernández*, p.2

250 fishes and rather more fragmentary details on reptiles, serpents, insects and quadrupeds.⁴⁶ Pineda, 'in the short space of three years alive on the [Malaspina] voyage', was able, through his energy and dedication, 'to satisfy the demands of an infinite number of savants of Europe, to make substantial collections and to fill his Writings with so many discoveries and observations that their publication will perhaps overturn and cause a general revolution in the literary World'.⁴⁷

Following Pineda's untimely death, his fellow naturalist Luis Née continued his collecting duties. Née visited Botany Bay in 1793 and was able to supply the Real Gabinete with some coveted Australian artefacts. In an article in the *Anales de Historia Natural*, the then director of the Real Jardín Botánico Antonio Josef Cavanilles described having seen amongst the ethnological collections of the Real Gabinete 'harpoons and lances of the natives of New South Wales'. Cavanilles scrutinised these weapons and concluded – perhaps predictably – that 'their simplicity and shabbiness correspond[ed] to the limited intelligence of those men' who had made them.⁴⁸ Having remarked upon the backwardness of the Aborigines, the botanist proceeded to offer a description of the kangaroo. The Real Gabinete was not, sadly, in possession of one of these creatures. Spain was, however, not entirely devoid of kangaroo parts, as Née had managed to glean a kangaroo's tooth from an aboriginal woman. The tooth had been worn by the woman as a necklace, and 'for this reason, still had glued to its root a handful of skins'.⁴⁹

⁴⁶ Arias Divito, *Las Expediciones Científicas*, p.22

⁴⁷ *Elogio Histórico*, p.9

⁴⁸ Antonio José de Cavanilles, Domingo Fernández, Christiano Herrgen, and Luís Proust, (eds.), *Anales de Historia Natural*, Vol. III, Madrid, Imprenta Real, 1800, p.202

⁴⁹ *Ibid.*, p.205

In addition to the formal scientific expeditions outlined above, Spain benefited from the scientific investigations of several military men serving overseas. Spain's most scientifically active soldier was, perhaps, Don Félix de Azara, who, deployed in the wildernesses of Paraguay for almost twenty years, entertained himself by studying his enforced new homeland. Azara surveyed the region geographically, creating detailed maps and plans. He scoured the archives of Asunción in search of 'all that had been printed or handwritten' about the history of the colony, and he recorded the physical and moral qualities of the local Indians.⁵⁰ Finding that such activities did not satisfy him intellectually, Azara also scrutinised the local fauna, sending some of his stuffed birds and quadrupeds to the Real Gabinete.⁵¹ The Spaniard claimed to have thus remitted between six and seven hundred specimens to Madrid over the course of his career, including a particularly valuable consignment of birds in 1789, 'accompanied by the manuscript of the first version of his celebrated 'Notes of a Natural History of the Birds of Paraguay', and by a seventy-four page index of 'the birds contained in the jars'.⁵²

Another less celebrated military collector was Don Antonio Parra. Portuguese by birth, Parra was stationed on Cuba in 1763 as part of the Mallorca Infantry Regiment. Like Azara, the soldier supplemented his formal obligations with a more peaceful pursuit. As he himself recounted, 'the multitude of admirable productions in which the Island of Cuba and the seas that surround it abound, in the three Kingdoms, Animal, Vegetable and Mineral, inspired in me, from the moment I entered it, a great desire to accumulate a collection'. Parra duly devoted his 'spare moments' to the

⁵⁰ Azara, *Viajes*, Vol. I, p.15

⁵¹ *Ibid.*, p.1

⁵² José María López Piñero, 'Juan Bautista Bru (1740-1799) and the Description of the Genus *Megatherium*', *Journal of the History of Biology* 21, 1988, p.150

‘acquisition’ of Cuba’s natural treasures forming a respectable collection of predominantly maritime species, ranging from fish to crabs and sponges.⁵³ When several ‘subjects of distinction’, inspected Parra’s efforts and ‘judged the entire collection to be of an exceptional merit’, the soldier resolved to donate it to the Spanish King, Charles III, as a testament to ‘the great love I have always professed for [His] Majesty’.⁵⁴ He superintended the construction of several ornate wooden cases in which to convey and exhibit his treasures, authored descriptions of each of his specimens, and enlisted the artistic talents of his son to illustrate these descriptions with illuminated plates. Further encouraged by the receipt of a letter from the Director of the Real Gabinete, ‘in which he exhorted me to continue in the acquisition of whatever I could find’, Parra dispatched his entire collection to Madrid in 1785.⁵⁵ He received, in recompense, ‘an assignation of 2.000 pesos annually and the payment of 4.000 pesos more to cover the debts he had incurred’,⁵⁶ and was subsequently contracted by the Crown to study the botanical productions of Cuba, sending to Spain seeds and live specimens that it was hoped might be successfully transplanted to Madrid.

Diligent Officials:

Formal expeditions did not constitute the sole source of natural treasures. In addition to dispatching savants to distant lands, the Spanish Crown mobilised existing networks of government to procure artefacts for the Real Gabinete and the Jardín

⁵³ Antonio da Parra, *Descripción de Diferentes Piezas de Historia Natural, las Más del Ramo Marítimo, Representadas en Setenta y Cinco Láminas*, Havana, Imprenta de la Capitanía General, 1787, pp.1-2

⁵⁴ *Ibid.*, p.2

⁵⁵ *Ibid.*, p.3

⁵⁶ Guirao and del Pino, ‘Expediciones Ilustradas y Estado Español’, p.419

Botánico. In this respect, Spain possessed something of an advantage over her European rivals. Thouin's network of correspondents, as described by Spary, was extensive, but somewhat haphazard, dependent upon personal contacts and chance acquaintances. Dávila and Gómez-Ortega were, by contrast, able to exploit Spain's well-established colonial structures to accumulate the specimens they required, soliciting natural curiosities from viceroys and governors overseas.

Paula de Vos has underlined the importance of this 'bureaucratic network'. She observes that, though usually subordinated in the historiography to the more spectacular achievements of the scientific expeditions, the consignments of specimens 'listed in ships' registers alongside the usual cargo of porcelain, silk and spices from Manila and wool, hides, dyestuff and silver from New Spain' were, in fact, an indication 'of the Crown's widespread commitment to empirical science and natural history collecting'.⁵⁷ She and Antonio Barrera also argue that the Spanish Crown's use of bureaucratic channels to acquire knowledge about the natural histories of its territories overseas predated the Enlightenment and had its institutional roots in the sixteenth and seventeenth centuries. The Royal Chemical Laboratory, for instance, was founded in 1695 during the reign of Spain's last Habsburg monarch, Charles II – not usually remembered for his sparkling intellect – whilst Barrera has identified the sixteenth century *Relaciones geográficas* and the expeditions of the naturalist Francisco Hernández and the astronomer Jaime Juan in the 1580s as evidence that, even at this early stage, 'the Crown promoted the collection of empirical data as a basis for imperial knowledge'.⁵⁸

⁵⁷ Paula de Vos, 'Research, Development and Empire: State Support of Science in the Later Spanish Empire, *Colonial Latin American Review*, Vol.15, June 2006, p.57

⁵⁸ *Ibid.*, p. 60

In order to formalise the specimen-collection process, the King issued an official document in 1776 entitled *Instrucción hecha de orden del Rey N.S. para que los Virreyes, Gobernadores, Corregidores, Alcaldes Mayores e Intendentes de Provincias en todos los Dominios de S.M. puedan hacer escoger, preparar y enviar a Madrid todas las producciones curiosas de Naturaleza que se encuentren en las tierras y pueblos de sus distritos, a fin de que se coloquen en el Real Gabinete de Historia Natural que S.M ha establecido en esta corte para beneficio e instrucción pública*. This document, authored by the Gabinete's director Dávila, was circulated to all viceroys overseas, who were expected, in turn, to disseminate it to their subordinates in the provinces.⁵⁹ The *Instrucción* informed recipients what items were most ardently desired for the Madrid cabinet, and, if possible, where the said items might be located. It stated, for instance, that the sloth was 'common in the provinces of Guayaquil and Cartagena de Indias', that the vicuña, the guanaco and the llama were to be found 'in Peru, in the Sierra', and that colonial personnel in New Spain should avail themselves of a Mexican anteater, 'called izquipatl by the Indians'.⁶⁰ It also ordered imperial officials to extend their collecting talents to the human productions of their respective regions. Dávila stipulated explicitly that

As the intention of the King is to complete, as far as is possible, his Gabinete, not only with the substances composing the three kingdoms of nature: mineral,

⁵⁹ Dávila did not formally put his name to the *Instrucción*, but Ernesto Lemoine Villicaña deduces from the detailed content of the document that its author had firsthand knowledge of the fauna of New Granada and Quito, Dávila's native region. The botanist Casimiro Gómez Ortega explicitly confirms this hypothesis in his written instructions to Ruíz and Pavón, when he refers to 'an instruction that Don Pedro Dávila formed last year on the orders of the King, asking the Viceroys, Governors and Corregidores of the Indies to send to the Gabinete de Historia Natural de Madrid all of the most curious productions of nature [to be found in their respective regions]'. See Ernesto Lemoine Villicaña, 'Instrucción para aumentar las colecciones del Gabinete de Historia Natural de Madrid, 1776', *Sobretiros del Boletín Núm. 2 del Archivo General de la Nación*, México, 1961, p.206; and Casimiro Gómez-Ortega, 'Instrucción a que deberá arreglarse los sugetos destinados por S.M. para pasar en la América Meridional, en compañía del Médico don Joseph Dombey, a fin de reconocer las plantas y yerbas y de hacer observaciones botánicas en aquellas partes', in Ruíz, *Relación histórica*, Vol. I, p.398

⁶⁰ Dávila, *Instrucción*, p.5

vegetable and animal, but also of other curiosities of art, such as costumes, weapons, instruments, furniture, machines, idols and other things used by the ancient Indians or other nations, any piece of this class that can be acquired would be greatly valued, for instance some *antiguallas* of the Indians, *Quipus* or other things that survive to this day.⁶¹

The *Instrucción* exhorted colonial officials to take great care in the preparation and transportation of prospective museum pieces. To that end, it supplied detailed advice on how best to catch and store natural artefacts. Small mammals, stated Dávila, should be sent to the Gabinete stuffed, a procedure which the *Instrucción* described in grizzly detail. Larger beasts, such as the sea cow (manatee), were to be skinned, taking scrupulous care to preserve their horns, hooves, teeth or other distinguishing features, whereas reptiles and ‘monsters’ could be conserved in barrels of alcohol, changing the solution at regular intervals to remove impurities. Butterflies were to be caught with a net whilst resting on the ground, before being flattened between the pages of a book, and fisherman should be recruited for the collection of marine life. The latter should be asked to alert the authorities to any interesting shells that entered their nets, ‘to observe and note the places where they are found, and to go and search for them specifically, if it be considered suitable, as other nations do with utility’.⁶²

Most importantly, the *Instrucción* stipulated that all specimens must be clearly labelled ‘in order to avoid errors’.⁶³ It also requested additional details where possible, asking, for instance, if the object in question was an animal, for information regarding ‘the age and sex, the normal size, where it lives or is to be found, how many offspring

⁶¹ Ibid., p.19

⁶² Ibid., p.23

⁶³ Ibid., p.24

it gives birth to at a time, the length of its pregnancy, how it is killed, to what use it is put, at what season the males mate with the females, what it eats and how it lives; in short, everything that it is possible to know about each species'.⁶⁴ Dávila acknowledged that some of these requirements could only be fulfilled 'where there is an able subject to whom they may be assigned',⁶⁵ whilst a follow-up royal decree complained that many of the items dispatched to Madrid were in less than perfect condition, 'coming confused with one another, without sufficient indication as to their qualities and without the care necessary for their integrity and preservation'.⁶⁶ The *Instrucción* seems, nevertheless, to have elicited a positive response from Spain's representatives overseas, generating an impressive haul of specimens. The Viceroy of Peru, Manuel de Amat y Junyot (1761-76), for example, 'oversaw numerous shipments of specimens and curiosities...from Peru to Spain throughout his vice-regency', and one of his successors, Viceroy Croix, 'sent (via the botanist Pavón) a series of textiles and feathered headdresses'.⁶⁷ The megatherium skeleton, perhaps the most prized exhibit on display in the Real Gabinete, also emanated from an official, in this case the Viceroy of the Río de la Plata, the Marques de Loreto. According to José Garriga, who scrutinised the creature in 1796, its bones were 'received on 29 September 1789 in seven boxes, with a notice explaining that it had been found in the

⁶⁴ Ibid., p.24

⁶⁵ Ibid., p.24

⁶⁶ Secretaria de Gracia y Justicia, *Instrucción Circular*, Madrid, 27 August, 1788. Paula de Vos has located 'at least twenty-two different royal orders' of this nature requesting natural history specimens or information about them. See Paula de Vos, 'Natural History and the Pursuit of Empire in Eighteenth-Century Spain', *Eighteenth-Century Studies*, Vol. 40:2, 2007, p.215

⁶⁷ Deans-Smith, 'Creating the Colonial Subject', p.179

excavations that were taking place on the banks of the River Luján, which runs alongside the village of that name'.⁶⁸

Not all of the items mentioned in the *Instrucción* were native to Spanish territory. In addition to American animals such as the sloth, Dávila mentioned several creatures that could only be procured outside the Spanish empire. The Gabinete's director coveted a lion, a tiger, a rhinoceros, a gazelle and a zebra. He solicited from the East Indies a 'big and fat' toad, and 'a species of goat that has very large antlers, raised above its head and twisted into a spiral, so as they seem like works of art',⁶⁹ and he informed readers pointedly that the butterflies of China were 'many and very rare', and would constitute an enviable addition to the Gabinete. 'All of the insects that Mademoiselle de Merian published in her *History of Insects of Surinam* [1705]' should also be sought for the Madrid museum, though this last request posed fewer logistical difficulties.⁷⁰ True, Surinam was a Dutch colony, but Dávila suspected that most of the insects mentioned by Merian could also be found in Guayaquil and other territories in Spanish New Granada, where the climate and vegetation were largely the same.

In those cases where the species desired lay outside of Spain's colonies, Dávila continued to rely upon the zeal of imperial personnel, urging Viceroys and Governors to exploit existing commercial networks to procure the necessary specimens. The director of the Real Gabinete ordered 'the governor and captain general of Manila', for instance, to 'solicit from China, from the coasts of Malabar, from Goa, from Pondichery and from other foreign establishments, many curiosities

⁶⁸ Joseph Garriga, *Descripción del Esqueleto*, p.2

⁶⁹ Dávila, *Instrucción*, pp.4-7

⁷⁰ *Ibid.*, pp.10

and rare things'. He entreated the governors of Ceuta and Oran to make similar efforts, and he appealed to the missionary friars operating in Africa to collect the fauna native to that continent, 'where the birds exceed those of America, and where there are some very singular quadrupeds'.⁷¹

Dávila hoped, by exploiting the complementary avenues of commerce and diplomacy, to secure rare and coveted species for the Madrid museum, making the Gabinete one of the most extensive collections in contemporary Europe. In the event, the director's aspirations seem to have been at least partly fulfilled, for when Juan Mieg wrote his guidebook *Paseo por el Gabinete de Historia Natural de Madrid* in 1818, he noted several items from Africa and Asia. Perusing the *Sala de Aves*, Mieg's fictional museum visitors spotted an African ostrich, 'the giant in its class', as well as a bird of paradise and a peacock, a 'magnificent bird...originating from the East Indies'.⁷² Concluding their tour in the *Sala Botánica*, meanwhile, Mieg's imaginary museum-goers scrutinised a 'Chinese instrument, called a *tamtam*, composed of a metallic alloy of copper and zinc', which was apparently 'used in theatres for funeral ceremonies, military music etc.'. ⁷³ This treasure was presumably on view courtesy of the governor of Manila, as was the elephant, whose stuffed corpse and skeleton occupied the same room.

If Dávila was aware that certain species would require a special effort to obtain, on account of their location, he acknowledged, equally, that not all governors would excel in the preparation and classification of natural specimens. Not every royal official was a budding taxidermist. Nor were the representatives of the crown

⁷¹ Ibid., p.4

⁷² Mieg, *Paseo*, pp.27-67

⁷³ Ibid., p.508

necessarily the people best suited to collect and prepare the local fauna and flora.

With this in mind, the *Instrucción* intimated that, where necessary, governors should delegate the specimen-gathering process to whomever they adjudged best qualified to perform the task. Writing to Viceroy Bucareli of New Spain in 1776, the minister of the Indies, José de Gálvez made this point clearly. 'I am enclosing for Your Excellency copies of the *Instrucción*', stated Gálvez. 'I leave it to your judgement to distribute them amongst the subjects who should fulfil the corresponding responsibility; without it being sent uniquely and privately to the Justices of the towns, since the priests of the said towns, and perhaps other private persons, whom I shall leave it to you to select, may be able to execute it with skill'.⁷⁴

Gálvez's supposition that the clergy might exhibit a flair for natural history in fact proved a legitimate one. Félix de Azara was aided in his studies by Don Pedro Blas Nosedá, priest of the village of San Ignacio Gûazú, from whom he elicited 'many good observations'.⁷⁵ Another priest, Dámaso Antonio Larrañaga, sent a letter to the botanical society of Barcelona in 1804 via a mutual friend, Don Miguel Antonio Vilardebó, in April 1804, along with a selection of seeds, which 'since the greater part of them is unknown to Botanists, I have considered it necessary to classify them for myself, adhering as much as possible to the writings and systems of Linnaeus',⁷⁶ whilst Don Baltasar Jaime Martínez Compañón, Bishop of Trujillo, distinguished himself as a particularly valuable contributor to the Gabinete's collections. As María de los Angeles Catalayud Arinero has noted, the Bishop sent many ethnological artefacts to the institution in 1788, related to the Indians in his diocese, including six

⁷⁴ Letter from José de Gálvez to the Viceroy of New Spain, 10 May 1776, in Lemoine Villacaña, 'Instrucción', p.218

⁷⁵ Azara, *Pájaros*, Vol. I, p.1

⁷⁶ Larrañaga, *Escritos*, Vol. III, pp.252-256

boxes of ceramics, mainly vases.⁷⁷ Compañón also compiled a history of the region, which featured many illustrations of local wildlife, such as the armadillo depicted below (see chapter 4 for further discussion of Compañón's natural history illustrations).



Fig.1: Armadillo, Trujillo del Peru, Vol.VI, Plate 9

Zenith...

The exertions of Spain's naturalists, the munificence of her monarch and the diligence of her imperial officials furnished the Real Gabinete with an impressive array of specimens. Contemporaries alluded to the extension and uniqueness of this collection.

⁷⁷ Catalayud, 'El Real Gabinete de Historia Natural', p.274

Many explicitly interpreted its richness as a testament to the vastness of her empire and the industry and efficiency of her representatives overseas.

In the prologue to his 1786 translation of Buffon's *Histoire Naturelle*, for example, the Gabinete's vice-director José Clavijo y Fajardo commended the 'zeal' of the ministers the Duke of Grimaldi and the Count of Floridablanca, who had been instrumental in the foundation and expansion of the Madrid museum, predicting that 'when, in concordance with the orders given by the King, samples of the rich and singular productions of his vast dominions in America have been collected...the Nation can hope to possess the richest and most precious Museum in the Universe, and make other Nations pay with interest for the productions of Natural History that they now sell to us at such inflated prices'.⁷⁸ An oration printed in the *Memorial Literario* in 1788, shortly after the death of Charles III, was similarly jubilant in its assessment of the Real Gabinete. Here 'we have seen formed this immense collection of the singularities of nature, brought at considerable expense not only from Europe, but also from Asia, Africa and America', trumpeted the oration, 'so that all parts of the world may be said to have contributed to forming the most complete treasure of Natural History that exists in the universe'.⁷⁹

Another admirer of Spain's imperial reach was the traveller Antonio Ponz. Bemoaning the late creation of the Real Gabinete, Ponz adjudged the previous absence of such an institution to be all the more 'reprehensible' given that 'with only the productions of her provinces, [Spain's Natural History Cabinet] could be the

⁷⁸ Clavijo Fajardo, *Historia Natural*, p.xii

⁷⁹ 'Oración de la Real Academia Española al Rey Nuestro Señor con motivo de la muerte del Rey Padre Don Carlos III Nuestro Señor', *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, Madrid, Imprenta Real, 1788, p.701

rarest, the richest and the most instructive in Europe'.⁸⁰ Now that the Real Gabinete had been founded, the Spaniard prophesied a bright future, commenting, in 1783, that 'this cabinet can already be counted amongst the best that are known; and if in the years that follow it continues to be enriched with the zeal with which it was begun, it will be counted as the first of its kind'.⁸¹ Indeed, when Ponz scrutinised the Gabinete's Parisian rival in the Jardin des Plantes, his conclusion was favourable to the former. 'In spite of the many years that this cabinet has existed and the few that ours in the Calle de Alcalá may count upon', ruminated Ponz, 'I can assure you that [the cabinet] of Paris probably does not have in any branch [of natural history] as many and as rare curiosities as that of Madrid, and in terms of order and curiosity it certainly does not equal that of the latter city. It may, perhaps, contain a greater number of things, but not more singular ones, in the branches that form these collections'.⁸²

Of course, Clavijo-Fajardo and Ponz were both Spaniards, and thus inclined to view their nation's achievements in a favourable light. Praise of the Real Gabinete was not, however, confined to Spanish subjects, for the institution also elicited positive reviews from non-nationals. One such individual was the North American Charles Peale, who singled the Gabinete out for compliments in a 'Discourse Introductory to a Course of Lectures on the Science of Nature' delivered in the University of Pennsylvania in 1800. The Spanish Museum, Peale reported, was 'said to be the richest in the world'. This was due largely to the 'punctuality with which

⁸⁰ Ponz, *Viaje de España*, p.487

⁸¹ *Ibid.*, p.487

⁸² *Ibid.*, p.1725

[Dávila's] orders have been and are constantly executed', a paragon of dedication that had 'rendered the Museum of Madrid one of the compleatest [sic] in Europe'.⁸³

Another foreigner to commend the Gabinete was the English traveller, Richard Phillips, who inspected the institution in 1803 and advised fellow tourists to follow in his footsteps. The museum, Phillips stated, 'is a collection of great interest, as it contains from Spanish America and the Manilas [the Philippines] curiosities *which cannot be possessed by any other museum in Europe*' [my italics]. This collection boasted, 'among the other rarities'

immense snakes from Oronooko [sic]; extraordinary fish; curious birds, virgin silver and gold; specimens of the pottery of the ancient Peruvians, highly curious; some representations of idols; rude, but very much in the Egyptian manner, particularly several vessels, on the exterior parts of which are the images of deities, exactly like the Canopus [sic] pots of Egypt.

Phillips also examined 'a Japanese drum, the most sonorous I ever heard', and some 'pictures of the intermarriages of the Spaniards and Indians, with the offspring, to mark the gradations of colour'.⁸⁴ These latter were examples of the *Casta* paintings whose composition, collection and inclusion in a cabinet of natural history illustrated another facet of Spain's ordering of its imperial possessions.⁸⁵

⁸³ Charles Wilson Peale, *Discourse Introductory to a Course of Lectures on the Science of Nature: with Original Music, delivered in the hall of the University of Pennsylvania, no.8, 1800*, Philadelphia, Zachariah Poulson Junior, 1800, p.26

⁸⁴ Phillips, Richard, *A Tour through the Principal Provinces of Spain and Portugal, Performed in the Year 1803 with Cursory Observations on the Manners of the Inhabitants*, London, Barnard and Sultzter, 1806, p.48. For a discussion of Mexican and Peruvian *Casta* paintings see Deans-Smith, 'Creating the Colonial Subject', pp.169-204.

⁸⁵ For a discussion of Mexican and Peruvian *Casta* paintings see Deans-Smith, 'Creating the Colonial Subject', pp.169-204.

Phillips intimated that the Gabinete still had room for improvement, since ‘it is not so complete as these immense sources of wealth would lead one to expect’,⁸⁶ a view substantiated by the French ambassador to Spain, J.F. Bourgoing, who, whilst praising the Gabinete’s mineral collection, noted that ‘the classes of fishes, of birds and especially of quadrupeds are yet very incomplete’.⁸⁷ Both men, however, anticipated that these deficiencies would soon be rectified. Phillips reported that an individual named ‘Forster’ had ‘been travelling, by order of the King, for the last eleven years in South America, where he has collected a vast array of new specimens’.⁸⁸ Bourgoing, meanwhile, envisioned an even more ambitious imperial project, whereby the King would install next to the Jardín Botánico natives of his overseas provinces, accompanied by their natural products – for example llamas from Peru and yerba maté from Paraguay – so that ‘the exulting inhabitant of the metropolis, without going from the capital, might pass in review, as if delineated on a map, all the colonies to which his sovereign gives laws’.⁸⁹ This particular display of colonial power was never in fact realised, and seems to have remained a figment of the Frenchman’s imagination. What *was* significant about Bourgoing’s proposal, however, was his assertion that, of all the European powers, Spain alone commanded the resources to make such a project conceivable. ‘The monarch of Spain only could be capable of carrying [the scheme] into effect’, affirmed Bourgoing in clear acknowledgement of Spain’s imperial grandeur.⁹⁰

⁸⁶ Phillips, *Tour*, p.48

⁸⁷ Bourgoing, *Travels*, p.102

⁸⁸ Phillips, *Tour*, p.49

⁸⁹ Bourgoing, *Travels*, p.102

⁹⁰ Bourgoing, *Travels*, p.102

That non-nationals should praise the richness of the Gabinete and associate this richness directly with Spain's imperial supremacy testifies to the institution's significance as a symbol of colonial power. That Spaniards should take note of the opinions of their European counterparts suggests that they too made this association and were sensitive to Spain's international reputation. Hence the *Memorial Literario, Instructivo y Curioso de la Corte de Madrid* of 1784 gloated that the munificence of Charles III and the efforts of Dávila to enrich the Gabinete 'cause the admiration of all Foreigners', a reaction of which it was evidently proud.⁹¹ And hence the botanist Antonio Josef Cavanilles challenged scornful Frenchmen 'to walk through the botanical garden of Madrid, and to say that it does not contain all that one could hope for, not from a nation in its infancy, but of one that has already reached maturity'. 'This establishment', continued Cavanilles, is 'worthy of our king, worthy of being envied by other nations; the rapid progress that it has made in so few years proves that my nation is neither lazy nor dull' – accusations that, as noted in Chapter 1, had been levelled at Spain by the author of the *Encyclopédie* article 'Espagne', Nicholas Masson de Morvilliers.⁹²

Cavanilles' passionate defence of his country suggests, moreover, that natural history had become a domain in which imperial power could be exhibited, indicating not only the extension of Spain's dominions, but her control over their natural resources, both human and non-human. This tendency to equate the domination and display of nature with imperial power was, as we have seen, by no means limited to Spain; Findlen cites the case of the Italian, Antonio Carlo Dondi, who, in his *Forerunner in the Form of a Letter of the Natural History of the Euganean Mountains*

⁹¹ 'Real Gabinete de Historia Natural', *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, Madrid, Imprenta Real, Febrero 1784, p.19

⁹² Cavanilles, *Espagnes*, p.72

(1780), described the collecting of nature as a means of ‘rendering a good service to your Fatherland’, and went on to envision a “public Museum of Natural History” that would showcase Italy’s natural resources’,⁹³ whilst Spary argues that Thouin’s ‘botanical networks were woven into the broader colonial projects of European nations in this period’.⁹⁴ What is noteworthy about the Spanish case, however, is that the contents of the Gabinete and the Jardín Botánico emanated from a vast, mature and tightly governed empire, and not a newly colonised one – unlike, for instance, Italy, which was not even a unified state in the eighteenth century, and would not become one until the exertions of Camilo Cavour and Giuseppe Garibaldi in the 1850s. The Madrid institution thus benefited from - and symbolised – Spain’s imperial grandeur.

...And Decline

It also mirrored its decline. For, if the Real Gabinete and the Real Jardín reflected the expansion of Spain’s empire, their contents – or rather, those objects they did not possess – likewise reflected its contraction. In this, the contrast with Britain and France is palpable. For the latter states, the first half of the nineteenth century constituted an era of imperial growth, as the British extended their control over the India subcontinent and French armies swarmed across north Africa. For Spain, however, the entire nineteenth-century was a virtually unmitigated disaster, synonymous with internal discord, foreign invasion and imperial dissolution. The trauma began in 1805, when Horatio Nelson mauled the Spanish navy under Admiral Gravina. It continued in 1808, when Napoleon invaded the peninsula, brutally

⁹³ Findlen, *Possessing Nature*, p.397

⁹⁴ Spary, *Utopia’s Garden*, p.96

suppressed the Spanish patriots who attempted to resist him, and it culminated in 1826 in the loss of almost the entire American empire, as José Antonio de Sucre vanquished royalist forces at Ayacucho in Peru following a sixteen-year long struggle for freedom.⁹⁵ Against such a tumultuous backdrop, Spain's scientific endeavours could not help but be severely constricted. Thus, whereas Richard Drayton's and Maya Jasanoff's collecting narratives unfold against the backdrop of imperial expansion, the Spanish story concludes against the backdrop of decline and contraction. It is this decline, and its impact upon the collections of the Real Gabinete, that is addressed in the final section of this chapter.

The first thing to note is how the unstable political situation restricted Spanish naturalists' ability to exchange both specimens and knowledge with their counterparts in other European countries. That these relations were important is indicated by Francisco Javier Puerto Sarmiento, who has recounted in detail Casimiro Gómez-Ortega's efforts to establish scientific relations between botanical institutions in Spain and its neighbours. Ortega engaged in these relations with the dual aims of augmenting the collections and the credibility of the Real Jardín Botánico. A European tour undertaken in 1775 secured the botanist contacts in France, Britain and Holland, notably André Thouin and William Aiton, the head-gardener at Kew, whilst the Spaniard also cultivated correspondents in several Italian cities, including Turin, Bologna, Florence and Genoa. The results were encouraging. To cite just one example of the fruits of this international exchange, we might note the Dutch contribution to the Real Jardín. According to Sarmiento, Dutch remissions to the Madrid institution were 'quantitatively small but qualitatively significant'. Hence, 'between 1784 and 1786 seeds from India, Ceylon [Sri Lanka] and Dutch trees were received in Madrid;

⁹⁵ John, Lynch, *The Spanish American Revolutions 1808-1826*, New York and London, Norton, 1973, p.283

in exchange, Spanish, Chilean and Mexican seeds were sent to Leyden' along with news of the expedition to New Spain'.⁹⁶

That Pedro Franco-Dávila assigned a similar level of importance to European exchange is clearly evidenced in the plan he drew up for the Gabinete prior to its establishment. In this document, the future director stipulated that there must be 'a Room in which to assemble all that is duplicated in the Gabinete, so as to be able to distribute it with method and economy to its counterparts in exchange for other productions that they will send us'. Dávila adjudged such a process of exchange to be 'essential' to the Gabinete's successful operation, and the requested room was duly installed.⁹⁷

The outbreak of European war severed many of these carefully crafted exchange programmes, stifling the flow of information, specimens and men of science between Spain and its neighbours. The career of the Spanish soldier-naturalist Félix de Azara symbolises this breakdown in scientific relations between Madrid and Paris. Between 1803 and 1806, Azara corresponded regularly with the French naturalists, Charles Anathuse Walckenaer, who was engaged in the translation of the Spaniard's work *Voyage dans l'Amérique Méridionale*. Azara supplied Walckenaer with several maps, notes and a portrait of himself, as well as 'the Spanish book on the tarantula', which he hoped would complement the Frenchman's work on Arachnids.⁹⁸ Walckenaer reciprocated by sending Azara a volume of the latter work, which the

⁹⁶ Puerto Sarmiento, *La Ilusión Quebrada*, p.191

⁹⁷ Catalayud, 'El Real Gabinete de Historia Natural', p.270

⁹⁸ Azara, *Viajes*, Vol. I, p.22

Spaniard claimed to have 'read with pleasure', gratified to discover 'so much wisdom, precision and exactitude' in its pages.⁹⁹

After 2 July 1806, however, this fruitful correspondence ceased. Walckenaer, who published *Voyage* nonetheless in 1809, expressed his regret at the curtailment of their relationship. He described how his subsequent efforts to contact Azara had been 'in vain', obliging him 'to deliver to the printers with a feeling of sadness those same pages that I composed with so much pleasure'.¹⁰⁰ The untimely silence of Azara was, of course, due, not to any negligence on the part of the Spaniard, but to Napoleon's invasion of Spain in 1808. Walckenaer, who must have known the true cause, did not allude to it specifically, probably out of patriotism. Azara's British biographer, William Hamilton-Smith, was less restrained. 'The ambition of a hero and a tyrant now altered the political relations between France and Spain', declared the Briton, 'and exchanged the friendly and peaceful intercourse of Naturalists and others for a deluge of misery, rapine and blood'.¹⁰¹

The activities of the 'hero and tyrant' also had a direct impact upon the status of Europe's natural history museums. The garden of the Empress Josephine at Malmaison contained, by 1803 'the most precious collection of vegetables that exists in Europe', according, at least, to Cavanilles, who listed specimens from such diverse places as New Holland (Australia), New Zealand, Mexico, Japan and the Cape of Good Hope.¹⁰² Collections in other European cities, however, were plundered by Napoleonic troops for the benefit of the Empire. The Real Gabinete succumbed to

⁹⁹ Ibid., p.23

¹⁰⁰ Ibid., p.18

¹⁰¹ Charles Hamilton Smith, *Memoir of Don Félix de Azara*, in Sir William Jardine's *The Naturalist's Library*, vol.5, London, 1843, p.75

¹⁰² José Antonio Cavanilles, 'Jardín de la Malmaison', *Anales de Historia Natural*, Vol. III, nº 16, p.70

Napoleonic pillaging in 1814. Some of the stolen exhibits were returned in 1815, after Waterloo, but not all, and not all in pristine condition.¹⁰³

More serious than the severance of European relations - a temporary, if traumatic affliction - was Spain's disintegration as an imperial power. The years between 1810 and 1826 witnessed the protracted collapse of the vice-regal system of government, and the emergence in South America of independent nations. They also saw Britain supersede Spain as a naval power, a fact recognised by no less a figure than the Liberator Simón Bolívar, who perceived the British navy as a guarantor of Spanish American independence; 'do not fear the Allies', Bolívar wrote to Francisco de Paula Santander on 14 June 1823, à propos the newly formed Holy Alliance, 'for the ditch [the Atlantic] is large and the English fleet still larger'.¹⁰⁴ This at a time when the Spanish monarch Ferdinand VII, determined to re-conquer his lost territories, had just bought some decrepit ships from Russia, several of which promptly sank.¹⁰⁵ Such dramatic imperial contraction could not help but impact upon Spain's scientific credentials, and by implication, upon the status of the Real Gabinete. This was reflected both in the absence from the museum of a number of coveted specimens and secondly in the diminishing status of its prize exhibit, the megatherium skeleton.

Juan Mieg enumerated some of the species that the Real Gabinete did not possess in his 1818 guidebook to the institution. Strolling through the *Sala de Aves* and the *Sala de Mamíferos*, the naturalist remarked upon the absence of the flamingo

¹⁰³ Catalayud, 'El Real Gabinete de Historia Natural', p.272

¹⁰⁴ Simon Collier, 'Nationality, Nationalism and Supranationalism in the Writings of Simón Bolívar', *Hispanic American Historical Review* Vol. 63 (1), 1983, p.53

¹⁰⁵ Pedro Voltes, *Fernando VII: Vida y Reinado*, Barcelona, Editorial Juventud, 1985, pp.151-152

and the cassowary.¹⁰⁶ He sighed over the lack of several well-known mammals, including the giraffe, the hippopotamus and the tiger. He alerted readers to the absence of ‘the ferocious wild boar of Ethiopia’ and the industrious beaver, and he deplored the failure to procure a rhinoceros, ‘the second largest terrestrial animal after the elephant’.¹⁰⁷

Two beasts whose absence particularly grieved Mieg were the kangaroo and the platypus, both of which originated from Australia. The naturalist suspected that the latter animal, with its duck-like beak and its seal-like body, might constitute ‘the link between the mammals and the birds’. He indicated that specimens of this rare creature could be seen ‘in the cabinets of Paris and London’, but confessed with regret that they had eluded the Real Gabinete, where visitors in search of Antipodean curiosities were obliged to content themselves with the kangaroo’s tooth and aboriginal weapons acquired two decades previously by Luís Née.¹⁰⁸ Though Mieg did not say so explicitly, he must have known that Spain, with its navy in disarray and its colonies engulfed in rebellion, was unlikely to rectify these losses in the near future. The presence of the kangaroo, the platypus and other exotic creatures in the museums of France and Britain, meanwhile, symbolised the shift in imperial power away from Spain and towards its northern European neighbours.

The relative decline of the Real Gabinete was also reflected in the decreasing importance of its most famous specimen, the megatherium skeleton (Fig.2). When it was first sent to Madrid from the Río de la Plata, and for many years thereafter, this extraordinary creature was the only complete skeleton of its kind to be found in

¹⁰⁶ Mieg, *Paseo*, pp.87-88

¹⁰⁷ *Ibid.*, pp.59-60

¹⁰⁸ *Ibid.*, p.160

Europe. Consequently, any naturalist wishing to study the animal was obliged either to visit Madrid, or, should that prove impracticable, to request information about the beast from his Spanish counterparts – a situation that conferred a degree of kudos upon the Gabinete and its personnel. The famous comparative anatomist, Georges Cuvier, unable to examine the megatherium in person, thus relied upon ‘a short relation by Citizen Roume [and] the presence of the plates [produced by the Gabinete’s dissector Juan Bautista] Bru’.¹⁰⁹ As late as 1818, the German naturalists Christian Heinrich Pander and Joseph Wilhelm Eduard d’Alton were likewise reliant upon Madrid for details about the megatherium. Irina Podgorny records how the Germans scrutinised the skeleton ‘*in situ*...and in 1821 published in Bonn new images of the fossil quadruped, confirming the existence of this animal about which no further information was to be had, and which remained ‘isolated’ by language and politics in Madrid’.¹¹⁰

Less specialist commentators also marvelled at the megatherium. The North American Charles Peale alluded to ‘the skeleton of a large non-descript animal’ in his aforementioned lecture, remarking that its teeth resembled ‘a grinder in my museum [in Philadelphia], which was found in digging the Santee Canal’,¹¹¹ whilst Phillips devoted several paragraphs to the creature. The Briton explicitly identified the enormous quadruped as ‘the most remarkable object’, though, contrary to Cuvier, he

¹⁰⁹ Garriga, *Descripción del Esqueleto*, p.1

¹¹⁰ Irina Podgorny, ‘Los Gliptodontes en París: Las Colecciones de Mamíferos Fósiles en los Museos Europeos del Siglo XIX’, in *La Ciencia en la Argentina entre Siglos*, Marcelo Monserrat (ed.), Buenos Aires, Manantial, p.311. Juan Mieg alluded to a ‘new description of this important skeleton...currently being published in Germany’ in his 1818 museum guidebook, referring, presumably to the work of Pander and d’Alton. See Mieg, *Paseo*, p.442

¹¹¹ Peale, *Discourse*, pp.27-28

suspected that the skeleton was 'of the cat kind, and appears to have been a sort of gigantic tyger [sic]'.¹¹²

By the 1830s, however, as Podgorny indicates, this situation was beginning to change. Various efforts to procure a three-dimensional replica of the Madrid skeleton for the museums of London and Paris might have been rebuffed, but this ceased to matter as non-Spanish agents started to acquire equally impressive fossils at source, in America itself. Charles Darwin famously exhumed a whole range of fascinating bones at Punta Alta in Argentina, including, 'parts of three heads and other bones of the megatherium'.¹¹³ The British Chargé d'Affaires in Argentina, Sir Woodbine Parish, was another energetic supplier of bones,¹¹⁴ whilst both Owen and his French counterpart Paul Gervais received material in 1841 from Rosas' Neapolitan propagandist, Pedro de Angelis.¹¹⁵

Nor were London and Paris the only European capitals to obtain exotic American fossils. The Danish naturalist, Peter W. Lund, furnished the Academy of Sciences in Copenhagen with fossil bones he had extracted from the caves of

¹¹² Phillips, *Tour*, p.49

¹¹³ Charles Darwin, *Journal of Researches into the Natural History and Geology of the Countries Visited during the Voyage Round the World of H.M.S. Beagle, Under the Command of Captain Fitz Roy, R.N.*, London, John Murray, 1905, p.77

¹¹⁴ Parish supervised the extraction of several fossil bones from the Argentine pampas and encouraged local people to inform him of any interesting discoveries. 'The great interest taken by men of science in Europe in these remains was not lost on the South Americans', reported Parish. 'I sent to Buenos Ayres the descriptions which were published of them at the time, with plates showing the parts which we possessed in this country, and those which were still wanting to complete our knowledge of these lost monsters, and I urged some of my acquaintances there to exert themselves in case of any new discoveries to endeavour to supply our deficiencies'. Don Hilario Sosa duly ceded the megatherium skeleton unearthed on his estancia to Parish, who forwarded it to Professor Owen in London. Pedro de Angelis also remitted 'another interesting collection of fossil bones from the Pampas' to England, where it was 'purchased by the Royal College of Surgeons'. See Parish, Woodbine, *Buenos Ayres and the Río de la Plata*, Second Edition, London, 1852, p.218.

¹¹⁵ See Paul Gervais, 'Mémoire sur Plusieurs Espèces de Mammifères Fossiles propres à l'Amérique Méridionale', in *Mémoires de la Société Géologique de France, Deuxième Série, Tome Neuvième, V*, Paris, 1873 and Richard Owen, *Description of a Giant Ground Sloth, Mylodon Robustus*, London, J.E. Taylor, 1842

Brazil,¹¹⁶ whilst the Argentine physician, Francisco Javier Muñiz, dispatched some of his palaeontological discoveries to the Academy of Sciences in Stockholm via his contact, Mr. Bellberg. Carl Swindell, director of the Academy, wrote to Muñiz in 1864, thanking him for the collection of fossils, and informing him that ‘the members of the Academy, equally interested in palaeontology, have had occasion to admire the state of perfect conservation of the head of your *muñifelis bonaerensis* [probably a sabre tooth tiger] that forms part of it’.¹¹⁷

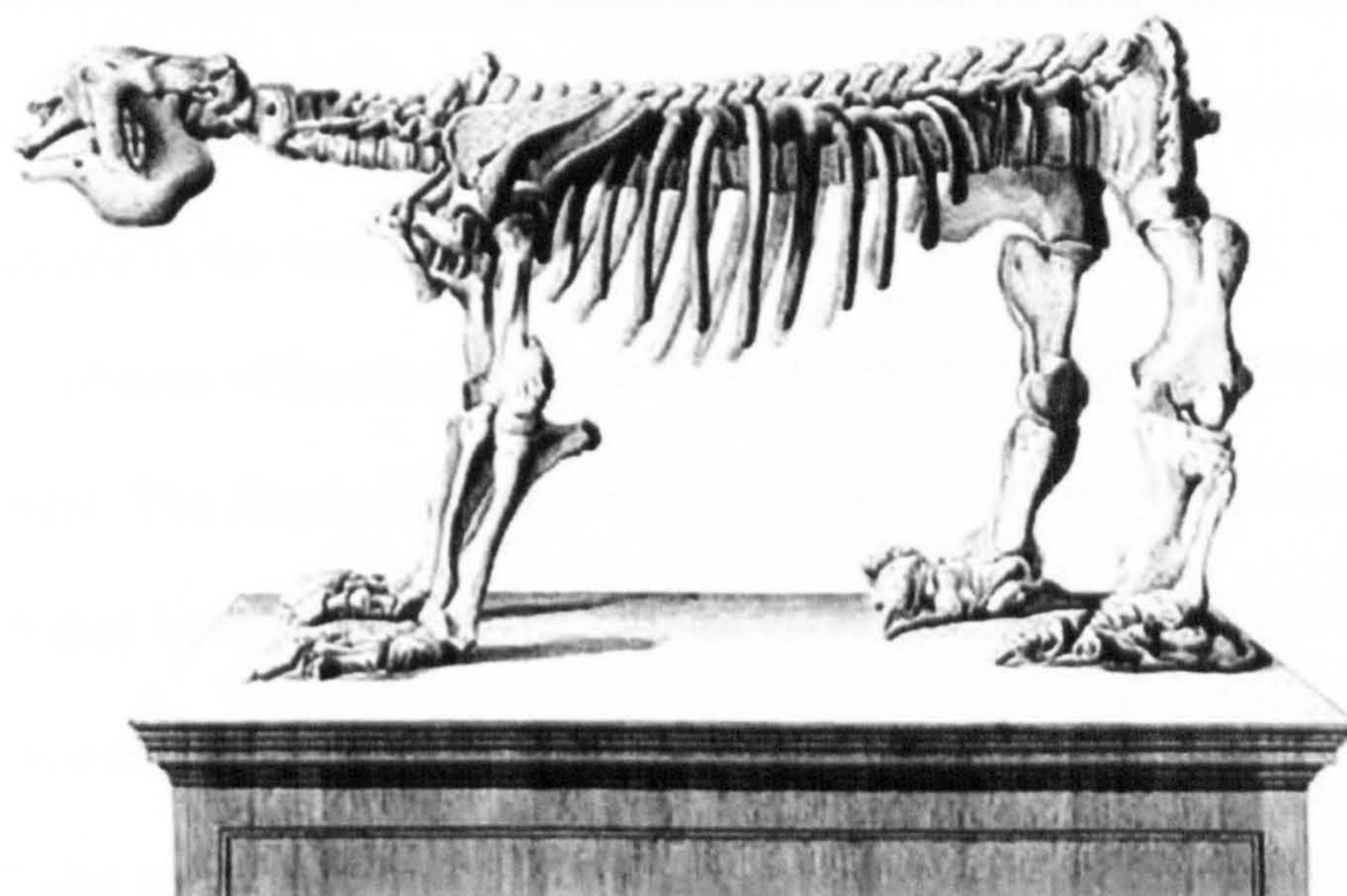


Fig.2: Juan Bautista Bru, the Megatherium in the Real Gabinete de Historia Natural, in Joseph Garriga, *Descripción del Esqueleto de un Quadrúpedo muy corpulento y raro que se conserva en el Real Gabinete de Historia Natural*, Madrid, Imprenta de la Viuda de Don Joaquín Ibarra, 1796

Muñiz’s dealings with the Swedes occurred well into the nineteenth century, when the days of Spanish rule in Argentina were long past. The shift in collecting patterns manifested itself much earlier, however, and was visible to the museum-going public as well to the more specialist scientific community. The Briton John Miller, for example, reported having seen ‘a llama and an alpaca in the zoological garden in the Regent’s Park’, and ‘a guanaco at Exeter Change’ in the late 1820s,

¹¹⁶ Gervais, ‘Mémoire’, p.21

¹¹⁷ Domingo Faustino Sarmiento, *Vida y Escritos de Francisco Javier Muñiz*, Buenos Aires, 1901, pp.204-205

though he conceded that the llama was ‘not a handsome specimen’.¹¹⁸ An article in the *Times* on 28 January 1835, announced the arrival of a capybara at the Surrey Zoological Gardens, predicting that this ‘thick-set, clumsy animal’ would form ‘an interesting object to the visitors of those gardens’,¹¹⁹ whilst an 1836 list of the creatures at London Zoo interpreted the impressive variety of species on display as direct testimony to Britain’s economic penetration of Spanish America. ‘What a collection it is! What a proof that our commerce is pushed to the ends of the earth!’ boasted the list’s author. ‘Look at the localities; look at the Condor, the child of fable but a few years since, and then remember that Sir Francis Head saw a Cornish miner wrestling with one in the Andes’.¹²⁰

The exhibition of London Zoo’s first live anteater in 1853 generated even more excitement. The *Times* adjudged the insectivore ‘by far the most remarkable animal which they have acquired since the hippopotamus’, obtained in 1851.¹²¹ The London Zoological Society promised to secure ‘accurate drawings of its various peculiar attitudes and actions’ for its portfolio,¹²² whilst the giant edentate even captured the imagination of the novelist, Charles Dickens, who devoted a column to the anteater in his *Household Words*. Dickens characterised the animal as ‘a zoological wonder – a thing never before seen in Europe’,¹²³ and he speculated that

¹¹⁸ John Miller, *The Memoirs of General Miller*, New York, AMS Press, 1973, Vol. II, p.233 (footnote)

¹¹⁹ *The Times*, Wednesday 28 January 1835, p.7, Issue 15699; col. B

¹²⁰ ‘List of the Animals in the Gardens of the Zoological Society, with Notices Respecting Them and a Plan of the Gardens, Showing the Buildings and Enclosures in which the Animals are Kept’, *The Quarterly Review*, June 1836, p.316

¹²¹ *The Times*, Saturday, 1 Oct, 1853; pg.8; Issue 21548; col. C

¹²² *The Times*, Friday, 7 October, 1853; pg.9; Issue 21553; col. D

¹²³ This may not have been true. Another Briton, William Bullock, claimed in the 1816 catalogue of his London Museum that a large anteater had ‘some years since [been] brought alive to Spain, where ‘it was fed on raw meat, cut small, of which it ate four or five pounds a day’. John Talbot Dillon substantiated this claim in his account of the Real Gabinete, remarking that ‘the Great Ant-bear from

the insectivore's arrival would occasion a deluge of anteater memorabilia. 'Should it live and get its rights', fantasised the novelist, 'we shall have ant-bear quadrilles, ant-bear butter dishes, ant-bear paperweights, ant-bear pictures of all sorts, and perhaps a dash of ant-bear in the Christmas pantomime'.¹²⁴ And no wonder. For here was living and fascinating proof of Britain's impressive imperial reach.

Under such altered conditions, the Spanish megatherium was not entirely forgotten – the Frenchman Théophile Gautier, for instance, referred to it as a 'marvellous fossil' when he toured Madrid in 1840 – but it had lost its unique aura. So too had the Real Gabinete that housed it, for, as Gautier's assessment indicated, the Madrid museum was worth a visit if one was in the vicinity, but was not sufficient on its own to justify a trip to the city. With its 'piece of virgin gold that weights six pounds', its 'Chinese gongs' and its 'portraits representing all the varieties that can be born from the crossing of the white, black and copper-coloured races', the Real Gabinete was more a glorified cabinet of curiosities than an institution at the cutting edge of science.¹²⁵ Consequently, when the Spanish naturalist Marcos Jiménez de la Espada sought material with which to compare the specimens he had collected during an expedition to South America in 1865, he was obliged to consult the 'interesting

Buenos Ayres, the *Myrmecophaga jubata* of Linnaeus, called by the Spaniards Osa Palmera, was alive at Madrid in 1776, and is now stuffed and preserved in this cabinet'. See William Bullock, *A Companion to the London Museum and Pantheon of upwards of Fifteen Thousand Natural and Foreign Curiosities, Antiquities and Productions of the Fine Arts; Now Open for Public Inspection in The Egyptian Hall, London*, London, Whittingham and Rowland, 1816, p.107; and Ebenezer Sibly, *Magazine of Natural History, comprehending the whole Science of Animals, Plants and Minerals divided into distinct parts, the characters appropriately described and systematically arranged*, London, 1794-1808, Vol. III, p.553

¹²⁴ *The Times*, Saturday 15 October, 1853; pg.9; Issue 21560; col. B. The *Times* also announced the arrival of other South American species at London Zoo. It reported in 1858 that 'a pair of giant anteaters...have been added to the collection'. It also advertised other 'recent additions' in 1858, among them 'the Norwegian elk and a new Jaguar (from Mazatlan)'. See *The Times*, Thursday, May 18, 1854; pg. 1; Issue 21744; col A – Classified Advertising, and *The Times*, Wednesday, Apr 21, 1858; pg. 1; Issue 22973; col A

¹²⁵ Théophile Gautier, *Voyage en Espagne*, Paris, Charpentier et Compagnie, 1870, pp.114-115

types of South American fauna' on display at the museums of Paris and Munich.¹²⁶

Students of American zoology seemingly could no longer rely solely upon the artefacts available in Madrid.

For a final example of Spain's imperial decline, we may turn to another text by Mieg, a work entitled *Instrucción sobre el Arte de Conservar los objetos de Historia Natural*. Published in 1817, this slim volume tackled the delicate art of taxidermy. It enumerated the many delights to be derived from collecting and stuffing mammals, birds and insects, and it offered a step-by-step guide to the latest best practice in animal preservation.

Mieg's *Instrucción* reprised many of the themes that appear in Dávila's 1776 text of the same name. Like the Quiteño, Mieg proffered invaluable information on 'the art of removing the skin, preserving and mounting birds'. He detailed the correct 'method for preparing the skeletons of animals'. He described 'the means of catching and preserving insects' and he informed his readers how to 'collect plants, dry them and form herbariums'.¹²⁷ Where Mieg diverged from Dávila, however, was in the scope of his prospective readership. In contrast to the first director of the Real Gabinete, who petitioned Spanish bureaucrats across the globe for such rare beasts as 'the lion, the tiger, the panther, the rhinoceros, the gazelle, the zebra [and] the Mexican anteater', Mieg insisted that it was 'more valuable to begin by studying and collecting the products of ones own country before concerning oneself with those of China, of America or of new Holland'. The naturalist questioned whether it was not

¹²⁶ P. Agustín Jesús Barreiro, *Diario de la Expedición al Pacífico llevada a cabo por una Comisión de Naturalistas Españoles durante los años 1862-1865, Escrito por D. Marcos Jimenez de la Espada, Miembro de la misma*, ed. P. Agustín Jesús Barreiro, Madrid, Real Sociedad Geográfica, 1928, p.257

¹²⁷ Juan Mieg, *Instrucción sobre el Arte de Conservar los objetos de Historia Natural, precedida de algunas reflexiones sobre el estudio de las ciencias naturales*, Madrid, Imprenta de Villapando, 1817, Index

‘shameful to encounter every day individuals who...can tell us a multitude of things about the crocodile and the chameleon, who know perfectly the characteristics of the rattle snake and the boa, whilst they have never dared to touch one of our lizards, nor learned to distinguish a frog from a toad, nor a viper from a harmless snake?’ and he stipulated that local nature should take priority over exotica from distant realms.¹²⁸

Whilst Mieg may have had a point in scientific terms, such reasoning also constituted a tacit admission of an unpalatable truth. It acknowledged, albeit implicitly, that Spain’s empire was, by 1817, in the advanced stages of disintegration; its viceroys and governors were currently more concerned with suppressing separatist rebels than with supplying the Real Gabinete with pressed flowers and jaguar skins, whilst Creole intellectuals were busy establishing rival institutions (such as Dámaso Antonio Larrañaga’s Biblioteca in Montevideo), serving in rebel governments (Hipólito Unanue in Peru) or expiring before royalist firing squads (Francisco José de Caldas and Jorge Tadeo Lozano in Bogotá). General Pablo Morillo, it is true, did find time in his pressing schedule of rebel executions to appropriate some of the botanical and mineralogical collections formulated by Celestino Mutis’s botanical survey of New Granada (begun in 1783),¹²⁹ but in general the picture was decidedly bleak. Mieg might sweeten this bitter pill by asserting that ‘the peninsula, I repeat, is more interesting and richer [in terms of natural history] than any other country in Europe’,

¹²⁸ Mieg, *Instrucción*, pp.31-34

¹²⁹ Martínez Sanz, *Relaciones Científicas entre España y América*, p.249. Morillo appropriated Mutis’ botanical drawings and the astronomical instruments used by the French Academicians to measure the meridian in Quito. He also forwarded to Madrid ‘the greatest known grain of platinum’, ‘a young, rare and monstrous eagle’ and ‘a small box of seeds that was delivered to me by the Commissioner of the Botanical Garden of this Court’. See Letter from Pascual Enrile, 14 March, 1817, *Fragata Diana*, La Habana, in José Celestino Mutis, *Flora de la Real Expedición del Nuevo Reino de Granada*, Madrid, Ediciones Cultura Hispánica, 1954, Vol. I, p.133.

but it remained extremely difficult to swallow for a people who, a decade earlier, had commanded the resources of a global empire.¹³⁰

¹³⁰ Mieg, *Instrucción*, p.34. José Gogorza presented an even more dismal picture when he summarised the museum's contents in 1891. The Spaniard characterised the reign of Charles III as a 'period of advancement' for natural history, but regretted that 'the wars and revolts that shook the entire country in the first third of our century made their malicious influence felt and drowned in their origin these first efforts executed in favour of the natural sciences'. Gogorza bemoaned the reduced supply of specimens from overseas, which made it impossible to participate in exchanges with other museums, though he did mention some more recent acquisitions from Spain's remaining imperial possessions, including 'some birds from the island of Paragua in the Philippines, donated by D. Felipe Canga-Arguelles', a donation of reptiles 'from Dr. Osorio, product of his explorations in Spanish Guinea' and some 'crystalline stalactites' collected in Matanzas by 'Señor Pocy, professor of Natural History in the University of Havana, and General Serrano'. See José Gogorza, *Reseña y Guía de las Colecciones de Historia Natural*, Madrid, Escuela Tipográfica del Hospicio, 1891, pp. 5, 29,61 and 18.

Chapter 3: The Marvellous and the Monstrous: Displaying Nature's Wonders

On Easter Monday 1738, the celebrated French engineer Jacques de Vaucanson unveiled his latest and most ambitious technological marvel to the citizens of Paris. Vaucanson's newest creation was a mechanical duck. It could be seen perched on a plinth in a special display room, flanked by two equally intriguing automata – a flautist and a tambourine player – and it astounded viewers with its extensive array of talents. When activated by its creator, the avian impersonator quacked, waddled about and flapped its copper wings, which were designed to exactly replicate the muscular structure of those of a real bird. Yet more exciting were the duck's digestive abilities. Presented with grain, the animal swallowed it, digested it and expelled it in little pellets from its rear end. It owed its food processing talents to a complex set of tubes implanted within its body. As Vaucanson himself explained, 'the matter digested in the stomach is conducted by tubes, as it would be in the animal by guts, to the anus, where there is a sphincter that permits its exit'.¹

Vaucanson's duck represented the height of human ingenuity and elicited widespread acclaim. Audiences throughout Europe scrutinised this mechanical miracle, which swiftly embarked upon a continental tour. They marvelled at its capabilities, as it guzzled and defecated. They familiarised themselves with the structure of its wings, the internal workings of which Vaucanson had left partially exposed for educational purposes - 'my aim being rather to demonstrate than simply to show a machine' - and they proclaimed the duck's inventor a mechanical genius.²

¹ Jacques de Vaucanson, *Le Mécanisme du Fluteur Automate, Présenté à Messieurs de l'Académie Royale des Sciences par M. Vaucanson, Auteur de cette Machine. Avec la description d'un Canard Artificiel, mangeant, buvant, digérant et se vidant, épluchant les ailes et les plumes, imitant en diverses manières un canard vivant. Inventé par le même. Et aussi celle d'une autre figure, également merveilleuse, jouant du Tambourin et de la Flute, suivant la relation qu'il en a donnée depuis son Mémoire écrit*, Paris, Jacques Guerin, 1738, p.19

² *Ibid.*, p.20

Amidst this torrent of awe, however, Vaucanson's duck found at least one detractor. In 1817, introducing a treatise on the preservation of natural history specimens, Don Juan Mieg, professor of physics and chemistry and a member of the Royal Academy in Madrid, expressed scepticism as to the significance of Vaucanson's achievements. Where many other commentators had focused upon the engineer's boundless abilities, Mieg chose to highlight his limitations. 'Vaucanson', ruminated Mieg, 'has known how to construct a mechanical duck, that has excited the admiration of the whole of Europe, because it walked, moved its wings, grazed, ate and ejected its food in the normal way after having digested it'. Such a feat was impressive, but, to Mieg's mind, hardly constituted proof of Vaucanson's genius, or indeed that of any human inventor. 'Could this famous mechanic have formed a flea in the same manner?' asked Mieg. Clearly not, for no man was capable of reproducing the features of such a tiny insect. Yet God, the true master architect, had sculpted millions of these delicate animals and limitless other wonders. 'If one examines under the microscope the works of men', concluded Mieg, 'they lose all their merit, and that which we admired as perfect offers no more than a shapeless chaos'. By contrast, 'the works of nature always gain from such an examination, and our enchanted eye discovers at every moment new perfections, new worlds that evidence the greatness of their author'. For Mieg, therefore, God alone was a great artist; Vaucanson was, and could only ever be, a skilled artisan.³

³ Mieg, *Instrucción sobre el Arte de Conservar los Objetos de Historia Natural*, pp.6-7



Fig.1: Vaucanson's 'Canard Artificiel', from Stafford, Barbara Maria, *Artful Science: Enlightenment, Entertainment and the Eclipse of Visual Education*, Cambridge, Massachusetts and London, the MIT Press, 1994, p.192

This chapter explores the interface between science and education. Like Vaucanson, who insisted that his purpose in exhibiting his fabulous duck was 'rather to demonstrate than simply to show a machine', Spanish naturalists championed a questioning, interactive engagement with nature. They counselled against uninformed amusement, and they expatiated on the benefits of what their British counterparts called 'rational recreation'. José Clavijo y Fajardo stipulated that his aim in translating Buffon's famous *Histoire Naturelle* into Spanish was 'to disabuse the many people who see natural history as a mere diversion, or as a fruitless curiosity',

and ‘to excite Spanish youth to dedicate itself to a science that unites the useful and the pleasant’.⁴ Juan Mieg likewise despaired at the ‘sterile admiration’ he witnessed in the galleries of the Real Gabinete. He proposed to rectify this unsatisfactory state of affairs by writing an instructive guidebook for the museum, ‘placing in the hands of those who have not occupied themselves with [the study of] natural history a simple and abbreviated explanation of the most curious objects, and especially of the animals that, through their utility, their organisation and instinct, excite so greatly our admiration’.⁵ The chapter asks why naturalists accorded such importance to the transmission of scientific knowledge, and also *how* this knowledge was transmitted via textbooks and guides like Mieg’s. It analyses the didactic techniques that contemporaries deployed to enliven and simplify the study of natural history, such as fictional dialogues and interactive forms of learning. It attempts to re-construct the experience of visiting the Real Gabinete and other similar collections and it reviews the moral and religious messages that could be derived from the study of nature.

The source base for this chapter consists of a variety of textbooks and popular science works available in Spain in the eighteenth and early nineteenth centuries. These include Padre Esteban Terrero’s y Pando’s translation of the Abbé Pluche’s *Spectacle de la Nature* (*Espectáculo de la Naturaleza*, 1755, 1771), José Clavijo y Fajardo’s rendition of Buffon’s *Histoire Naturelle* (*Historia Natural*, 1785, 1791) and Juan Mieg’s aforementioned guide to the Real Gabinete, *Paseo por el Real Gabinete de Historia Natural de Madrid* (1818). In order to situate these texts within broader educational trends, the chapter compares these works with several non-Spanish equivalents dating from this period, such as Charles Wilson Peale’s *Discourse*

⁴ Clavijo-Fajardo, *Historia Natural*, Vol. I, p.ix

⁵ Mieg, p.v

Introductory to a Course of Lectures on the Science of Nature (1800) and John Ripplingham's *Natural History According to the Linnaean System, Explained by Familiar Dialogues in Visits to the London Museum*, (1817). It considers to what extent the Spanish literature reflected wider contemporary concerns, and to what extent it diverged from them.

One problem that many of the 'Spanish' texts pose is that they were, in fact, translations of foreign works, and their content may not, therefore, reflect Spanish attitudes. The chapter suggests, however, that the decision to translate these texts into Castilian did indicate a desire to relay their contents to Spanish readers, whilst the republication of Terrero's and Clavijo's translations attests to the popularity of these works in Spain. Moreover, the need to import educational texts from abroad is in itself significant, since it is symptomatic of a desire for modernisation and reform and an awareness of the nation's current backwardness. The journalist Juan Blasco Negrillo grumbled, for example, that 'because the many estimable works of this species that have been published recently have not been propagated amongst us, either in their original form or translated, there is a widespread ignorance of what should be understood by *Natural Historia* or the *natural sciences*'.⁶ Clavijo-Fajardo, meanwhile, pronounced Spain 'backwards in the fundamental and methodical study of Natural History', and considered that 'the clearest testimony that I could give to our august Sovereign, and the greatest service that I could do for my country, was to translate, for the instruction of the young, the best work of Natural History that...is known'.⁷

⁶ Juan Blasco Negrillo, 'De lo que debe entenderse por Historia Natural', Vol. II, p.8

⁷ Clavijo-Fajardo, *Historia Natural*, p.vi. Clavijo-Fajardo's efforts did not put an end to concerns about the insufficient provision of natural history textbooks in Spain; this theme was reprised by later writers. José Gerber y Robles, for instance, lamented the dearth of adequate natural history primers in Spain when he wrote his own *Elementos de Historia Natural para uso de los Establecimientos de Instrucción Pública en España* in 1843, declaring that 'Our country, which has until now remained inert amidst the scientific advances of the rest of the nations, and which now seeks to arise from its lethargy, needs above all else elementary treatises that provide it with the easy comprehension of the great principles of

Spaniards thus turned to foreign textbooks to hasten the enlightenment of their compatriots, though they did not, as we shall see, always regurgitate their contents without modification.

Nature for All

In contrast to the Renaissance Wunderkammer, the museums of the eighteenth and nineteenth century were designed not merely to enchant, to shock and to entertain, but also to educate. This shift formed part of a wider movement towards 'rational recreation', which encouraged the public to channel its leisure hours into intellectually enriching pursuits. 'Informative as well as entertaining, illustrated popular books, optical cabinets, marvellous machines, astonishing experiments and provocative museum displays contributed to the swelling stream of public pedagogy, adult education and the recuperation of childhood that crested during the Enlightenment'.⁸

This instructive rationale was in evidence at the London Zoological Gardens (founded 1828), constructed, according to Sofia Åkerberg, 'in order to spread an interest in natural history among the public and at the same time to supply the means by which this interest could be satisfied'.⁹ It was equally palpable at William Bullock's London Museum (opened 1810), which was calculated to serve simultaneously 'the Study of

such a varied science, and which put it in a position to be able to access the enlightened writings of the great authors' (See José Gerber de Robles, *Elementos de Historia Natural para Uso de los Establecimientos de Instrucción Pública de España*, Madrid, D.L. de Burgos, 1843, p.i). It is noteworthy, nevertheless, that the majority of these writers excepted botany from their general censure regarding insufficient textbooks. Most Spaniards considered botany to be their nation's forte, and Negrillo, Mieg and Clavijo explicitly praised the quality of botanical instruction in Spain; an article in the contemporary periodical, *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, thus expressed particular approval for Antonio Palau's *Explicación de la Filosofía y fundamentos Botánicos de Linneo*, (1788), which was aimed 'at facilitating for the young the study and advancement of the most useful and agreeable part of natural history'. See 'Libros Traducidos', in *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, Madrid, Imprenta Real, 1788, p.42.

⁸ Barbara Maria Strafford, *Artful Science: Enlightenment, Entertainment and the Eclipse of Visual Education*, Cambridge, Massachusetts and London, the MIT Press, 1994, p.xxi

⁹ Sofia Åkerberg, *Knowledge and Pleasure at Regent's Park: The Gardens of the Zoological Society of London during the Nineteenth Century*, Umeå, Umeå University Press, 2002, p.101

the Naturalist, the Instruction of the Curious and the Amusement of those who are delighted in viewing the Beauties of Nature and the Curiosities of Art'.¹⁰

In this new climate of rational recreation, it was no longer acceptable simply to gawp at nature's wonders and to depart the museum with a pleasant but vague recollection and an imprecise sense of awe. It was necessary, on the contrary, to acquire and retain knowledge of natural history. Symptomatic of this attitude is a passage in John Ripplingham's 1817 guide to the London Museum, in which a fictional family, the Wilsons, chaperone young readers around the institution. Prior to entering the museum, Mr Wilson exhorts his offspring to listen attentively to his informative commentary and thereby to obtain a more thorough knowledge of its contents than their cousin, Sarah, who had recently enthralled them with her memories of Bullock's exhibition. Sarah might have conveyed the excitement of the museum, Mr Wilson concedes, 'But I hope that each of you will be able to give a better description of the Museum than I heard from some of your young friends'.¹¹

The move towards 'rational recreation' has received little attention in the Spanish context, yet it certainly had its exponents. In his translator's preface to the Spanish version of Buffon's *Histoire Naturelle* (1785), Joseph Clavijo y Fajardo emphasised the educational value of natural history cabinets. There were some, observed Clavijo, who 'seem to see the cabinets in which one places the productions of Nature as deposits destined for the ostentation of those who possess them, or merely to excite a sterile admiration in the curious'. This, however, was not the proper

¹⁰ William Bullock, *A Companion to the London Museum and Pantheon of upwards of Fifteen Thousand Natural and Foreign Curiosities, Antiquities and Productions of the Fine Arts; Now Open for Public Inspection in The Egyptian Hall, London*, London, Whittingham and Rowland, 1816, p.iv

¹¹ John Ripplingham, *Natural History According to the Linnaean System, Explained by Familiar Dialogues in Visits to the London Museum*, 2nd edition, London, N. Hailes, London, 1817, Vol. I, pp.1-2

function of such collections. On the contrary, 'these cabinets should be considered as Schools, in which one learns the rudiments necessary to know nature'.¹²

Clavijo's convictions found an equally ardent proponent in Juan Mieg, the Swiss chemist who wrote a guidebook for the Real Gabinete in 1818. In the prologue to this work, Mieg recounted how 'passing through the interesting galleries of the Museo de Historia Natural, frequented constantly by a growing crowd of curious persons, I heard the singular explanations of some people [and saw] the sterile admiration that the sight of this treasure produced in others' ('sterile admiration' was seemingly a common affliction at the time).¹³ The scientist proposed to substitute this uninformed observation for something more constructive and more durable. Visitors, Mieg believed, should exit the Real Museo with more knowledge than when they entered it. Quizzed about its contents by a neighbour, they ought to be able to muster a more suitable response than 'it is lovely, very lovely'.¹⁴

Knowledge about the natural world was considered invaluable for all strata of society. This was true throughout Europe, but it perhaps struck a particularly resonant chord in Bourbon Spain, where, as we saw in Chapter 1, the tangible benefits associated with natural history took priority over the more abstract attainments of experimental science. Reform-minded Spaniards advocated the dissemination of natural knowledge in order to create more efficient farmers, more effective doctors and more observant travellers, whose expertise would alert them to the useful products on offer in distant lands. They emphasised the direct links between scientific competence and economic resurgence and they lambasted earlier generations for their failure to educate the general populace in the rudiments of natural history.

¹² Clavijo-Fajardo, *Historia Natural*, p.xiii

¹³ Mieg, *Paseo*, p.v

¹⁴ *Ibid.*, p.6

One individual to espouse this view was the minister Gaspar Melchor Jovellanos. Addressing the measures that should be taken to improve Spanish agriculture in his *Informe de la Ley Agraria* (1795), Jovellanos stressed the pivotal role of natural history in Spain's agricultural development, and the need to initiate farmers and labourers in the tenets of the sciences. The minister conjectured that 'the exact sciences will perfect [the farmer's] instruments, his machines, his economy and his calculations', whilst 'those [sciences] that have as their object the great mother-nature will reveal to him her power and her immense treasures'. He specified the direct practical benefits that an acquaintance with natural history would confer upon the agricultural worker, who, armed with this information 'will end up knowing how many commodities he wastes through not having studied the prodigious fertility of the soil, and the climate in which providence placed him', and he prophesied that 'natural history, presenting to him the productions of the entire globe, will show to him new seeds, new fruits, new plants and herbs to cultivate and acclimatise [in his country] and new individuals of the animal kingdom to domesticate in his enclosure'.

Jovellanos explicitly criticised those members of the scientific community who disdained this type of instruction, convinced that it was 'impossible to make it descend to the coarse and illiterate populace'. He repudiated the brand of science that 'served only for the amusement and vanity of savants', and he proclaimed that useful knowledge could indeed filter down to the lower classes, even if only in a diluted form.¹⁵ 'The fluid of wisdom spreads and propagates itself', Jovellanos declared, 'and, being simplified and attenuated more and more on its journey, it is suitable, finally, for the comprehension of the most uncultured and simple persons'. Thus

¹⁵ Gaspar Melchor de Jovellanos, *Memorias de la Real Sociedad Económica de Madrid*, Vol. V, Madrid Imprenta de Sancha, 1795, p.118

the labourer and the artisan, without penetrating the mysterious language of the chemist in the analysis of loams, nor the reasoning of the naturalist in the bold investigation into the time and manner in which they were formed, know their use and utility as fertilisers, and in the dyeing of materials; thus they know all the useful things that the sciences have taught them in respect to loams.¹⁶

Jovellanos was not alone in advocating the popularisation of natural knowledge, for the authors of natural history textbooks frequently commenced with reflections on the practical benefits offered by the study of nature. Typical of this standpoint was Juan Blasco Negrillo, author of an article on the benefits of natural history that featured in the 1804 edition of the periodical *Variedades de Ciencias, Literatura y Artes*. In this article, Negrillo underlined the importance of natural history to the agricultural worker, who, ‘without certain knowledge related to this science, would not know how to raise with perfection his silkworms, nor how to care for his beehives, nor how to destroy the innumerable insects that attack all the productions of his efforts and industry’.¹⁷ The journalist stressed the value of botany to the doctor, ‘who owes to nature his numerous and excellent remedies’,¹⁸ and he bemoaned the opportunities squandered by merchants as a consequence of their ‘not having cultivated the part of Natural History that corresponds to their traffic in wools, skins, rubbers, resins, precious stones etc.’¹⁹ Negrillo insisted that, far from constituting a frivolous diversion, the study of natural history would benefit all classes of society, even women. ‘Were the beautiful sex to dedicate some of their many free

¹⁶ Ibid., p.119

¹⁷ Blasco Negrillo, ‘Historia Natural’, p.40

¹⁸ Ibid., p.37

¹⁹ Ibid., p.41

moments to acquiring some knowledge of this science', speculated Negrillo, they might encounter unimagined delights. At the very least, a woman who scrutinised nature might liberate herself from the multitude of 'fears, frights and troubles' to which her previous ignorance had exposed her. 'With what tranquillity and even curiosity would she see a harmless grass snake that would once have horrified her', exclaimed Negrillo, 'or an innocent spider that would previously have startled her!'²⁰

Negrillo's contemporaries found some slightly more pressing motives for the study of natural history than curing Spanish females of arachnophobia, but they repeated many of his other arguments almost verbatim. Prefacing his translation of Abbé Pluche's *Spectacle de la Nature*, Padre Estevan Terreros y Pando declared that his labours would be amply recompensed if they spawned practical benefits. 'I will have achieved my aim', stated Terreros, 'if the labourer learns from these books to better fertilise the land...to increase his harvest and to conserve his fruits; if the gardener is able to make his flowers more beautiful and to give them greater longevity; ... [and] if all Artisans improve their instruments, perfect their machines and advance their arts'.²¹ Juan Mieg voiced more or less the same sentiments in the prologue to *Paseo*. When one reflected upon the matter, contended Mieg, there was 'hardly a profession in which one or other branch of [natural history] did not have important applications'. An acquaintance with mineralogy, Mieg asserted, was 'to a certain point indispensable to the mining administrator, to the engineer, to the miner, to the physicist, to the chemist and to the metallurgist', and it was 'useful to the stone mason, to the architect, to the geographer, to the farmer, to the soldier etc.' Botany,

²⁰ Ibid., p.41

²¹ Noël Antoine de Pluche, *Espectáculo de la Naturaleza, o Conversaciones acerca de las Particularidades de la Historia Natural que han parecido más a propósito para excitar una curiosidad útil y formarles la razón a los jóvenes*, Translated into Spanish by P. Estevan de Terreros y Pando, Madrid, P. Marin, 1771-1773 (2nd edition.) Vol. I, p.xvi

meanwhile, was essential to the study of medicine, as was a familiarity with the tenets of zoology.²²

Looking and Learning

In order for the public to appreciate nature they had to be able to view it. They could do so at the Real Gabinete de Historia Natural, which, according to an article in the *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, was open every Monday. From October to May, the *Memorial* announced, the Real Gabinete could be viewed between nine and twelve in the morning and from three to five in the afternoon. In the summer months from June to September, the afternoon hours were slightly longer, running from four to seven.²³

The criteria for entering the Real Gabinete do not seem to have been especially stringent. The German traveller Christian Fischer, who toured Spain in the years 1797-1798, stated that the Real Gabinete was ‘open two times every week, including for the common people dressed in ordinary clothes’. It was consequently ‘much frequented’.²⁴ The British traveller Joseph Townsend reiterated this view. According to the Briton, ‘any person who is decent in appearance is admitted to walk round the rooms’,²⁵ though visitors were to refrain from carrying a sword or a cane ‘lest they might brake [sic] the glasses and injure the articles’.²⁶

²² Mieg, *Paseo*, p.x

²³ ‘Real Gabinete de Historia Natural’, *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, February 1784, Madrid, Imprenta Real, p.20

²⁴ Chrétien Auguste Fischer, *Voyage en Espagne aux années 1797 et 1798; faisant suite au Voyage en Espagne du citoyen Bourgoing*, Paris, 1801, p.41

²⁵ Townsend, *A Journey through Spain in the Years 1786-1787*, p.180

²⁶ Peale, *Discourse Introductory*, p.28

Admission to the Museo was free of charge, a characteristic that differentiated it from some of its contemporaries such as the British Museum, where one was obliged to apply in advance for tickets, to tour in parties of fifteen, and to confine one's visit to the space of two hours. Unfortunately, a somewhat lax admissions policy, coupled with the Gabinete's 'too easy access to places for amusement', rendered it frequently overly busy and 'generally too much crowded [sic]'.²⁷ Charles Wilson Peale, the source of this criticism, proposed to eradicate such inconveniences from his own natural history museum in Philadelphia by imposing a small entry fee. He speculated that this measure would deter the 'idle rabble' and make the experience more fulfilling for the better class of visitor, since 'those really desirous of information would freely pay a trifle'.²⁸

If the tenets of natural history were to be communicated effectively to a wider audience then it was not sufficient for nature to be physically accessible; it had, equally, to be intellectually accessible. In practice, this meant writing or lecturing on natural history in a format that non-experts could comprehend. It entailed simplifying complex scientific theories, explaining current systems of classification and renouncing some of the technical jargon that might baffle the uninitiated reader. It also entailed – at least in some instances – animating a potentially weighty subject through the use of witty asides, memorable examples and amusing anecdotes.

Juan Mieg's guide to the Real Gabinete offers a good illustration of this mixture of requirements and restraints. Wishing to make his work 'intelligible to every class of readers', Mieg acknowledged the need 'to provide entertaining explanations that were neither tedious nor pedantic', and explained that he had

²⁷ Ibid., p.28

²⁸ Ibid., p.39

abstained, for this reason, from using 'scientific language'.²⁹ Anxious, by the same token, to ensure that this work was accessible in economic terms to as wide a stratum of society as possible, Mieg also imposed certain additional restrictions upon himself. In the prologue to *Paseo*'s sequel, a collection of illustrations depicting the beasts in the Real Gabinete, Mieg related how, 'desirous of providing to all classes of reader who are interested in the marvels of nature a work that is amusing, instructive, vulgar, I have had to limit myself to a small number of plates'. The scientist duly selected his subjects carefully, portraying only those animals that 'through their exterior, through their habits or through their influence on our well-being, can offer most interest'.³⁰

The format that Mieg adopted for his guidebook was that of a dialogue between two fictional individuals. As the author stated in the prologue, 'I have supposed in all that follows a master [Maestro] strolling with his pupil [Discípulo] through the halls of the Museum, and explaining successively to him the most notable objects'.³¹ The question and answer genre was not an innovation on Mieg's part, but was, in fact, common to many educational texts of the period, being 'typical of most of the books of general instruction for children and adults from the 1810s to the 1840s'.³² As Eugenia Roldán Vera has argued, this format owed its popularity to its ability to diffuse fairly extensive amounts of information in a structured, accessible and logical manner. The question and answer approach, or catechism, condensed complex ideas and tended to gloss over controversies or debates surrounding the subjects covered. It was suitable for either private instruction or use in the classroom,

²⁹ Mieg, *Paseo*, pp.vi-vii

³⁰ Juan Mieg, *Colección de Láminas para servir de Suplemento a la Obrita titulada Paseo por el Gabinete de Historia Natural de Madrid*, Madrid, Imprenta de D.M. de Burgos, 1821, pp.4-5

³¹ Mieg, *Paseo*, p.ix

³² Eugenia Roldán Vera, *The British Book Trade and Spanish American Independence: Education and Knowledge Transmission in Transcontinental Perspective*, Aldershot, Ashgate, 2003, p.135

and, as Roldán shows, particularly well adapted to the needs of Joseph Lancaster's new monitorial system, thanks to the relatively light demands it placed upon the teacher – the questions and answers were provided so little imagination or explanation was required on his part.³³

Essentially, the catechism's strength lay in its ability to simplify broad topics, chopping a vast body of knowledge into digestible nuggets. The Spaniard José de Urcullu summarised this function with particular clarity in his *Catecismo de Historia Natural*, one of a series of texts printed in Britain by the publisher Rudolph Ackermann for distribution in newly independent South America. Explaining the merits of the catechism, Urcullu argued that 'one cannot present a child with the work of Buffon, or that of Goldsmith [both eminent naturalists]; but one can present him with a catechism, in which one finds a summary of what these savants have said'. This was because 'a catechism is to literature what maps are to the study of geography, or what the camera obscura is to the painting of landscapes', the aim of all of these devices being 'to reduce objects to small but precise dimensions, keeping between them the necessary proportions and harmony, so that the resulting picture does not present to the imagination the idea of chaos'.³⁴

Mieg's guidebook shared Urcullu's desire to disseminate knowledge of natural history to a broad readership – especially the young – via a form of dialogue. Nevertheless, it differed from Ackermann's catechisms in several important ways. As Roldán Vera has demonstrated, the question and answer format was, in its pure form, relatively rigid, allowing little room for debate or spontaneity in its exchanges. In Urcullu's text, one disembodied voice poses all of the questions, whilst another

³³ Ibid., p.147

³⁴ José de Urcullu, *Catecismo de Historia Natural*, London, R. Ackermann, 1824, pp.v-vi

mechanically supplies all of the answers. Neither speaker exhibits any definable character traits, or even, for that matter, possesses a distinct name, with the questioner being denoted merely by the letter 'P' (for 'pregunta', 'question') and the respondent by the letter 'R' (for 'respuesta', 'answer'). Mieg's guidebook, by contrast, grants its two protagonists identifiable social roles – those of master and pupil – and mimics the flow of a genuine discussion. It thus approximates more closely to the eighteenth-century dialogue or conversation genre, in which fictional characters discussed intellectual topics in a more informal setting, and the less educated party – often a child – was given the opportunity to arrive at conclusions by him or herself, with the helpful prodding of a parent or teacher.³⁵ Such a format was deemed effective because 'the characters and interests, the simplicity, sagacity, curiosity and sprightliness of the persons among whom [natural history] is discoursed' enlivened a complex subject, and enabled it to appeal, according to the English translator of Professor Raff's *System of Natural History*, to 'the young, the indolent and the uninformed'.³⁶

Two passages from *Paseo* symbolise this type of interaction. In the first, the fictional Master and Pupil engage in a conversation about the elephant, inspired by the sight of a stuffed pachyderm in the Sala Botánica. Instead of simply lecturing his charge on the form and habits of the animal, Mieg's Master invites the Pupil to relate what he remembers about the beast and interjects intermittently with additional information in order to embellish or clarify specific points. 'Repeat for us what interesting facts you have retained regarding [the elephant's] history, its behaviour, its

³⁵ Roldán Vera, *The British Book Trade and Spanish American Independence*, pp.161-163

³⁶ Raff, *A System of Natural History adapted for the Instruction of Youth in the Form of a Dialogue*, London, J. Johnson and G.G. Robinson, 1796, Vol. I, p.v

utility and how it is hunted', stipulates the Master, 'and I will add that which you have forgotten'.³⁷

In the second passage, which unfolds in the Sala de Petrificaciones, Mieg employs the technique described above, whereby a learner is prompted to solve nature's riddles for himself. Upon entering the room in the Gabinete devoted to fossils, the attention of both protagonists is seized by an enormous skeleton perched on a plinth. The Pupil, overawed by the size of the creature, exclaims that it must be an elephant, but the Master urges him to look more closely. The Pupil scrutinises the beast again, and amends his initial verdict. 'There is no elephant this size', he concedes, so the bones in front of them must belong to another animal, perhaps to one of those 'fossil elephants', whose dimensions, according to books he had read, were 'much superior to the living ones we know today'? The Master acknowledges that such animals exist, but instructs his companion to look once more at the skeleton before them; 'the proportions of the limbs, the head, the claws – do these resemble those of an elephant?' After a further examination, the Pupil admits that they do not, at which point the Master – deciding, presumably, that the guessing game has reached its limit – intercedes to put his young friend out of his misery, informing him that 'the bones of this enormous animal, that has been called *megatherium*, were found in Paraguay, close to the Río de la Plata, a significant depth beneath the earth'.³⁸

As the above examples demonstrate, Mieg promoted a genuinely interactive form of learning, in which children or young persons were encouraged to display their own knowledge and to arrive at the correct conclusions by themselves. The Master in *Paseo* was, of course, the expert in matters of natural history, and could have narrated

³⁷ Mieg, *Paseo*, p.465

³⁸ *Ibid.*, pp.441-442

the entire text, but Mieg preferred to have the Pupil participate more actively in the conversation, asking the questions which, presumably, he thought worthy of the curious reader. We find a similar approach to instruction in Ripplingham's *Natural History* (1815, reprinted 1817), when the fictional Mr Wilson asks his twelve-year-old son, Charles, to explain the meaning of the word 'Pantherion' to his younger sister, Anna. Like Mieg's Master, Mr. Wilson could have supplied the answer himself, but he thought it more useful to delegate the task to his son. 'I must not deprive Charles of an opportunity for gaining some credit', he states; 'he will tell you, Anna'.³⁹ This exchange exhibits with particular clarity the belief – still in vogue today – that teaching constitutes one of the best forms of learning. By allowing his son to deliver the explanation, Mr Wilson simultaneously permits Charles to flaunt his knowledge, helps Anna to augment hers, and enables himself to monitor Charles' understanding and correct any misconceptions.

The catechism was considered a particularly useful format for the instruction of children. It was not, however, confined exclusively to their education. As several authors stated explicitly, the dialogue style could appeal to adult readers as well as to younger learners. The former could skim through didactic texts to refresh or update their own knowledge. They could also use works of this nature as teaching aids for the instruction of others.

Juan Mieg clearly envisaged *Paseo* as being employed in this manner. In the prologue to his guidebook, Mieg intimated that it was 'flattering for a thoughtful man who enters a Cabinet of this class not to find himself as if in an unknown country, but to be able to direct the attention of others, and explain to them the properties and uses of a mineral or of a plant, the organisation, origin and habits of an animal'. *Paseo* was

³⁹ Ripplingham, *Natural History*, Vol. IV, p.3

calculated to facilitate this kind of activity. Should its content please the reader, suggested Mieg, then he could follow the fictional Master and his Pupil ‘from room to room and from shelf to shelf’, with ‘the book in hand’, guiding others through the objects on display.⁴⁰ The portable octavo format of *Paseo* no doubt facilitated this process, though, at some 512 pages in length, Mieg cannot seriously have expected readers to complete it during the course of a visit. He must, rather, have conceived of his guidebook as both a preparatory text (it could be purchased from the bookshop of a Señor Sanz in the Calle de Carretas or at the Gabinete itself), and as an educational souvenir through which visitors could consolidate the knowledge gained in the museum.

Mieg was not the only author to recommend the conversation format to an adult readership. Padre Estevan Terreros y Pando suspected that his translation of Pluche’s *Spectacle de la Nature* would prove useful to fathers, who, reading it, would ‘see how they must instruct their children with the greatest prudence and success’.⁴¹ José de Urcullu, meanwhile, suggested that Ackermann’s *Catecismo de Historia Natural*, though directed primarily at children, might also function as a helpful aide-mémoire for adult readers. As he explained in the introduction, a catechism could summarise more complex theories of natural history and sharpen hazy recollections about the natural world. ‘The catechisms published by Sr. Ackermann are of use to the young, and also even for those persons who have read a lot’, contended Urcullu, ‘for they constitute a quite extensive species of general index, to which they may turn should it be necessary to consult certain passages they no longer remember well;

⁴⁰ Mieg, *Paseo*, p.x

⁴¹ Pluche, *Espectáculo*, Vol. I, p.iv

having consulted the indications they find in the catechism, they will find renewed in their minds all that they had read on the matter'.⁴²

The conversation genre thus simplified the tenets of natural history to make them more palatable for a non-expert readership. They divided nature into digestible chunks and enlivened its study through the introduction of fictional characters with whom the reader could hopefully identify: children could learn from the experiences of other children, whilst adults could assume the role of the knowledgeable parent or teacher.

As some authors conceded, however, the written word could only go so far in conveying the form of a plant or the behaviour of an animal. Passive reading of a text such as Mieg's could conjure images of the contents of the Real Gabinete, but it was no substitute for viewing the real thing. To acquire a full appreciation of the natural world, it was not sufficient either to scan a book, or, equally, to gape uncritically at exhibits in a museum. It was necessary to synthesise the two approaches.

Pluche eagerly embraced the principle of active learning in his *Spectacle de la Nature*. The Abbé consistently championed the idea of learning through play, which he believed would whet youngsters' appetite for knowledge. He had his fictional Chevalier de Brevil engage in a spot of weaving in order to acquaint him with the artistry of the spider, and he insisted that a proper understanding of botany emanated, not from an overload of abstract information, but from concrete visual stimuli.⁴³ 'If one encounters a youth who is eager to learn and to instruct himself, and speaks to him of blotched, fleshy, oblong, sinuous, striped or fringed leaves, in the scientific language employed by the learned, then he will be surprised and confused, with

⁴² Urcullu, *Catecismo*, p.vi

⁴³ Pluche, *Espectáculo*, Vol.I, p.96

serious study smothering entertainment', meditated Pluche. Conversely, if one presented the youth with a selection of the plants in question, then he would soon grow to recognise them, and would, moreover, find the learning experience entertaining and enjoyable. 'Show him the leaves', urged Pluche, 'and he will comprehend in an instant the difference between the elm and the carpe, between the silver birch and the lime; he will know them thereafter without difficulty, and he will say upon passing through a forest or a meadow, this is the lesser alfalfa, this is the poplar, that is the oak, that a fir tree'.⁴⁴

The notion that education could and should be allied to play and practical experiments found similar support from Juan Mieg, who, introducing a collection of plates designed to supplement *Paseo*, suggested that children might amuse themselves by colouring in these images, which had been 'printed on a separate sheet' for this purpose, since 'experience has shown that an object of natural history that has been drawn but once is never erased from the memory'.⁴⁵ The botanist Gómez-Ortega, meanwhile, advised readers of the *Parte Teórica* of his 1788 *Curso Elemental de Botánica* to supplement their reading with the study of actual plants in order to aid comprehension. Ortega explained that 'the doctrines [of botany] have been illustrated by citing three plants in which one can see with ocular inspection the explanation that is received aurally'. He considered this visual element important, because 'the

⁴⁴ Ibid., Vol. II, p.9

⁴⁵ Mieg, *Colección de Láminas*, p.7. Ripplingham advocates a similar strategy in his guide to the London Museum when the fictional Charles Wilson, having studied the mammals on display in the Pantherion, proposes 'to draw up a little plan of this branch of Natural History, as I did of the birds. Charles mother endorses this activity and commends it as conducive to learning. 'I shall be very happy to see it', she declares, 'and shall esteem it as a very pleasing proof of your attention'. See Ripplingham, *Natural History*, Vol. IV, p.191

demonstration of the same natural objects will fix the ideas and botanical notions [in the mind] much more effectively than the pen or voice of the professor'.⁴⁶

The museum was, of course, the ideal venue for acquiring this type of knowledge, and museum directors could encourage the learning process by making a careful selection of objects and 'presenting them together with references, descriptions or diagrams'.⁴⁷ Ripplingham reflected on the value of such display techniques in his *Natural History*, when he had the fictional Miss Abbot remark, upon leaving the London Museum, that 'I could not have conceived it possible...to have acquired such an extensive acquaintance, trifling as it is, with natural history, in so short a time'. 'You could not, my dear, have done so by books alone', responds her chaperone Mr Wilson. 'But when the objects themselves to which the attention is directed are present to the view, their form becomes fixed in the memory; and with their appearance, all the material circumstances concerning them and that department of natural history to which they belong also become fixed in the recollection'.⁴⁸

In reality, of course, not all museums offered such ideal conditions. Poor lighting, insufficient space and uninspiring display techniques diminished their effectiveness as learning tools, and Mieg identified many of these failings in the Real Gabinete, when he alerted visitors to the 'lack of space, light and many other vices

⁴⁶ Casimiro Gómez-Ortega, *Curso Elemental de Botánica Teórica, Dispuesto para la Enseñanza del Real Jardín Botánico de Madrid*, Mexico City, Felipe de Zúñiga, 1788, Prólogo. Such techniques symbolised a Europe-wide shift towards rational recreation, which synthesised instruction with entertainment. The Valencian Jaime Roig, for example, applied this philosophy to the learning of letters and numbers, suggesting that 'it would be very useful to mix teaching with some amusement suited to the innocence of children, which, as it interests them, also instructs them'.⁴⁶ He recommended the game known as La Perinola for this purpose, and intimated that it might be used to instruct adults as well as children, since 'this game will be very suitable for shepherds, labourers and other uncultivated people, who grow up ignorant of these principles, and, with them, many things that they should know'. See Jaime Roig y Benet, *Método para dar a conocer y enseñar a pronunciar a los Niños las Letras, los Números, las señales de la Puntuación y algunas sílabas por medio del Juego de la Perinola*, Valencia, Joseph Esteban, 1791, p.3

⁴⁷ Cristina Mantegari, 'Museos y Ciencias: Algunas Cuestiones Historiográficas' in *La Ciencia en la Argentina entre Siglos*, Marcelo Monserrat (ed.), Buenos Aires, Manantial, 2000, p.299

⁴⁸ Ripplingham, *Natural History*, Vol. IV, p.191

that may be found in the primitive construction of the rooms of the old cabinet' – vices that he suspected would be especially apparent to 'those persons who have compared it with the beautiful museums of natural history of Paris and London'.⁴⁹ Mieg mentioned several specimens that eluded proper inspection, amongst them an anteater 'that can only be seen imperfectly'⁵⁰ and a selection of 'monstrosities, that cannot be examined on account of the darkness'.⁵¹ He chastised curators for their inadequate care of the insect collection, which, had it been better protected 'from contact with the air, the light, and above all certain voracious insects', would have remained in better condition, and he explained how these defects vitiated the study of its artefacts, for 'in order to classify a bird, it is necessary to see distinctly not only the beak and neck, but also the feet, the tail, the back – in essence, all of its parts', observations that could not be made when the creature in question was situated 'on a high shelf, often in the dark'.⁵² Such imperfections clearly compromised the Real Gabinete's suitability as a learning environment and made it compare unfavourably with some of its European rivals.

A Moral Dimension

Thus far we have highlighted the practical advantages associated with natural history and have examined some of the techniques used to facilitate its study, particularly, though not exclusively, among the younger generation. A desire to stimulate the economy and a determination to engage young minds were doubtless important stimuli for writers such as Mieg, who worked to popularise knowledge of the natural

⁴⁹ Mieg, *Colección de Láminas*, p.4

⁵⁰ Mieg, *Paseo*, p.113

⁵¹ *Ibid.*, p.111

⁵² *Ibid.*, pp.xi-xii

world. We cannot, however, fully understand their motivation, or the intended results of their output, without considering a further significant factor – namely a moral dimension. The writings of Mieg and his contemporaries were shaped by the social and religious concerns of their authors. They reflected, and in some instances contested, prevailing attitudes towards work and religion. They portrayed the study of natural history as conducive to both moral regeneration and Divine veneration.

Several writers embraced the study of nature as a morally uplifting and wholesome pursuit and prescribed it as a salutary antidote to contemporary vices. The American Charles Peale, for example, warned, ominously, that the young ‘unless diverted by some useful amusements...are heedlessly led into scenes of folly – and too often vices that embitter all their future days’, but speculated that through an early acquaintance with ‘the vivifying scenes of Nature’, the ‘high toned passions of the youthful nerve might be restrained until it gains maturity’.⁵³ The Briton, Ripplingham, meanwhile, construed the museum visit as the ideal opportunity to impart laudable social virtues such as industry and perseverance. In his guide to the London Museum, Ripplingham has his fictional father figure compliment the Museum’s proprietor, William Bullock, upon the magnitude and perfection of his collection, which had taken over thirty years to make. The young Charles, impressed by this revelation, expresses his surprise ‘that he did not become tired of it’, to which Mr Wilson delivers the mild rebuke that ‘it is the mark of weak-minded people soon to become weary of any pursuit’.⁵⁴ Natural history in this instance thus became synonymous with resilience and dedication.

⁵³ Peale, *Discourse*, pp.14-15

⁵⁴ Ripplingham, *Natural History*, p.63

The Frenchman Pluche also injected his natural history dialogues with suitably moralistic reflections. He used his fictional conversations to criticise 'the traditional noble values that eschewed trade and manual labour through his championing of artisans and world-wide commerce'.⁵⁵ He also pointedly contrasted the frivolity and glamour of the city with the more sedate, but ultimately more rewarding pleasures of natural history.

This ploy is evident in the opening chapter on the wonders of the insect world, in which Pluche has the fictional Conde de Jonval play devil's advocate with his young charge the Chevalier de Brevil. When the Chevalier confesses his enthusiasm for natural history, the Conde affects surprise and chides him for his unconventional passion, suggesting that a young man should have more pressing demands upon his time than the study of nature. Was the Chevalier not seduced, like his peers, by 'the bustle of the court? Did he not spend hours each morning selecting 'a tasteful and fashionable costume and an extraordinary tobacco box'? And did he not, after this mentally fatiguing task, restore his energy by 'passing the day gambling' or marvelling at 'the delights of the Opera, or the somersaults, kicks, grimaces and other movements of the harlequins and acrobats in the plaza or at the fair?' The Chevalier, who suspects, correctly, that his mentor is teasing him, insists that his interest in nature is genuine, and extracts the appropriate message from the Conde's gentle taunts. 'Señor, I understand very well the irony with which you want to make me understand that men judge things in reverse to how they should', ruminates the Chevalier; 'that they appreciate bagatelles, and scorn that which in reality truly pleases and satisfies'.⁵⁶

⁵⁵ Cynthia J. Koepp, 'Curiosity, Science and Experiential Learning in the Eighteenth Century: Reading the *Spectacle de la Nature*', in Immel, Andrea and Witmore, Michael (eds.), *Childhood and Children's Books in Early Modern Europe, 1550-1800*, New York and London, Routledge, 2006, p.154

⁵⁶ Pluche, *Espectáculo*, Vol. I, pp.3-5

The social benefits to be derived from natural history were not ignored by Spanish writers. The latter, indeed, often perceived their country to be lagging behind its neighbours when it came to attitudes towards the sciences. They exhorted their compatriots to change their views, to embrace nature, and to respect those who dedicated their time to its study.

Symptomatic of this approach was Negrillo's article in *Variedades* (1804), which, though published some sixty years after Pluche's *Spectacle de la Nature*, propounded markedly similar arguments. Addressing the motivation for collecting natural history artefacts, Negrillo observed that many of his contemporaries regarded such an exercise as 'a mere diversion and pastime', 'a brilliant uselessness' that was the preserve of 'powerful layabouts, who used their wealth to form cabinets, to found collections and to accumulate treasures, without any other object than to acquire at this price the vain reputation of a curioso'. Such scepticism was, Negrillo contended, unsurprising 'in a country where knowledge of Natural History is as retarded as it is amongst us'.⁵⁷ He proceeded to argue, however, that Spain's noble collectors, far from deserving the denomination of 'layabouts', were actually doing the nation a valuable service, and were, at the very least, foregoing less salubrious diversions. 'It would be desirable', claimed Negrillo, 'if this useful mania were to become common amongst well-off persons, and if they were to employ in this activity the money that they squander on gambling or any other pastime of a similar nature'. Moreover, even if some nobles *did* collect out of a desire for personal aggrandisement rather than a passion for scientific knowledge, then this did not render their actions entirely redundant. 'It is pride, probably, rather than Instruction, that causes the English Lords to collect in Italy and throughout Europe the precious antiquities of the arts',

⁵⁷ Blasco Negrillo, 'Historia Natural', p.36

remarked Negrillo. But when those Lords showed their haul 'to Wedgead [presumably Wedgewood] and other makers of porcelain', the latter were able 'to rectify the good taste of their artefacts', fostering economic advantages that Spanish Grandees would do well to note.⁵⁸

Admiring God's Creations

The study of natural history was therefore conceived as a cure for social ills and a stimulant to economic growth. It was also regarded, by some, as an ideal conduit through which to transmit God's glory, and a boost, thereby, to religious belief.

Mauricio Nieto has argued that 'the Euro-Christian vision of nature never abandoned the idea that the aim of the creation and of each one of its objects was the benefit of man'.⁵⁹ This interpretation of nature, known as natural theology, had converts throughout eighteenth and nineteenth-century Europe, and was perhaps particularly potent in Bourbon Spain, where a utilitarian, state-orchestrated approach to the sciences filtered out the more controversial elements of contemporary science and where many naturalists themselves professed strong religious convictions.

Mieg embraced the tenets of natural theology in *Instrucción* when he compared Vaucanson's celebrated duck unfavourably with the works of God. The Swiss chemist admired the perfection, the delicacy and the beauty of nature. He interpreted each lovingly crafted anatomical feature as evidence of the Creator's infinite wisdom, and he perceived the study of natural history as a prism through which to better appreciate God's creations. 'Upon examining the structure of the minerals and the organisation of the plant and the animals, from ourselves to inert

⁵⁸ Ibid., p.37

⁵⁹ Mauricio Nieto Olarte, *Remedios para el Imperio*, p.254

material, and from the whale to the fly that is only visible under the microscope, the trained observer finds at every step the miracles and master works of a hidden and merciful hand, of whose existence nothing will induce him to doubt', rhapsodised Mieg. Thus, 'the more that one immerses oneself in the sacred workshop of nature, the more one is persuaded of this great truth: that it is as impossible to be a good astronomer, physicist or naturalist and an atheist as it is to see and admire a magnificent temple without being convinced of the existence and ability of its architect'.⁶⁰

The Spaniard Clavijo exhibited a similar religious orthodoxy in his 1785 translation of Buffon's *Histoire Naturelle*, when he moderated or excised those passages in the French original that might offend Catholic sensibilities. Clavijo insisted that he respected Buffon, and that his intention was 'not to truncate or disfigure my model'. The Spaniard believed, nevertheless, that certain statements made by the French naturalist demanded qualification, and he likened his work as translator poetically to that of the bees, 'who collect from the stamen and the stigma of the flowers the honey and the wax and leave the rest'. 'The object of a translator must be to translate to his native language, for the benefit of his nation, the good things that have been written in other languages', stipulated Clavijo, 'but not to translate things that, in addition to not being useful or instructive, can cause damage, especially in the matter of Religion'. Consequently readers should read Buffon's controversial theory about the formation of the earth as if it were 'a novel, albeit a novel whose incidents are very instructive', whilst Clavijo himself took the liberty of diluting and softening some of the French author's more controversial statements,

⁶⁰ Mieg, *Instrucción*, pp.4-6

‘putting in place of *it is evident, it is certain, there is no doubt*, the phrases *it appears, it could be argued that* and other similar [expressions] that manifest doubt’.⁶¹

The natural history museum was the ideal venue in which to appreciate God’s wisdom and ingenuity, since it enabled the pious viewer to survey at a glance his most wondrous creations. This becomes obvious if we read Mieg’s 1818 museum guide, in which the tenets of natural theology surface at regular intervals. When, for instance, Mieg’s fictional museum-goers scrutinise the elephant, the Master delivers a lengthy oration on the creature’s trunk, which, in his view, symbolises ‘the wisdom of the Creator’. At first sight, the Master concedes, this curious appendage is not an object of great beauty. It is however, indispensable to its owner’s survival, for without it, how could the elephant pluck leaves from trees, uproot grass from the ground or guzzle water from rivers and lakes? A long neck, like that of the giraffe, might appear to constitute a viable alternative, but when one reflected upon the matter it was clearly unsuitable, since great muscular strength would be required to support a head as large as that of the elephant. Only a trunk, therefore, could solve the elephant’s dietary dilemmas, and only a wise God could have devised such a perfect remedy.

Should any doubts linger in readers’ minds as regards this point, then Mieg has his Master list other equally wondrous anatomical devices, including ‘the tail of the beaver, the hands of the mole, the tongue of the anteater’ and ‘the beak and feet of the pelican’.⁶² The author also ensures that his audience recognises the difference between God and his handiwork and directs its gratitude towards the appropriate recipient. When the Pupil, impressed by the elephant’s numerous qualities, assures his Master that ‘I will not pass by this elephant [in future] without looking upon it with

⁶¹ Clavijo-Fajardo, *Historia Natural*, Vol. I, p.lxxi

⁶² Mieg, *Paseo*, pp.467-468

admiration and expressing it', his companion gently reprimands him for misdirecting his praise. 'Be careful, my friend, of committing an impiety', warns the Master. 'It is not the animal whom you should admire for its instinct, but the Author of nature, who has bestowed that instinct upon it'.⁶³

God's wisdom manifested itself not only in the specific attributes of certain animals, but more grandly still, in the delicate equilibrium He sustained between the species. This harmonious balance was exemplified in *Paseo* by the composition of two similar creatures: the pangolin and the armadillo. Both small and toothless animals, these beasts would soon have succumbed to the depredations of ferocious predators, had God not supplied them with formidable defences – scales in the case of the pangolin, and a hard shell in that of the armadillo. Coated with this impenetrable armour, however, the harmless insectivores could survive the onslaught of the most vicious enemies and escape extinction. As Mieg's Master observes, 'here you can see the wisdom with which Providence has granted such notable privileges precisely to those beings that are most docile and pacific'. Had God been less discriminating in His bestowal of anatomical gifts, then the results might have been catastrophic; 'the tiger, with the spines of the hedgehog or the shell of the armadillo, would depopulate the world: for who would dare to oppose it?'⁶⁴ Fortunately, as things were, the animal kingdom was perfectly arranged to facilitate the survival of all its members, and God equipped each of His creations with the features necessary for its existence and propagation.

Equally impressive was God's capacity to work on a minute scale and with a perfection that no human being could equal. We opened this chapter with Mieg's

⁶³ Ibid., p.484

⁶⁴ Ibid., p.139

sceptical response to Vaucanson's mechanical duck, and his assertion that the engineer, for all his genius, could not have reproduced a flea in similar style. This conviction was expressed again by Mieg in *Paseo*, and was reiterated by other Spanish authors.

Perusing the Sala de Aves in the Real Gabinete, Mieg's imaginary visitors inspect a collection of birds' eggs and marvel at their beauty. In a remark that recalls the author's criticism of the *canard artificiel*, however, Mieg's Master trivialises the wonders of avian eggs by comparing them to those of insects. 'Contemplated under the microscope', these tiny objects, almost invisible to the naked eye, reveal 'a wealth of forms and colours that astound the observer'.⁶⁵ They simultaneously 'penetrate him with veneration for the sublime Author Who has known how to work on such a small scale'. Clavijo Fajardo eulogised in a similar manner the intricate structures of insects, particularly their eyes, and concluded that the study of natural history was useful in helping one 'to know and glorify the Creator'.⁶⁶ Examining the enormous skeleton of the megatherium, meanwhile, Juan Bautista Bru, the dissector at the Real Gabinete, ruminated over the function of the beast's potentially enormous tail (this part of the animal was not complete, so its true dimensions could only be guessed). The anatomist hypothesised that such a gigantic appendage must have served some useful purpose, since God never created anything superfluous to a creature's survival. 'Although it is not possible for me to confirm it', stated Bru, 'I cannot accept the idea that it [the tail] served as a pure and sterile Adornment: the great Mother Nature could not have designed it merely for this, and other known uses; probably she bestowed it

⁶⁵ Mieg, *Paseo*, p.45

⁶⁶ Clavijo-Fajardo, *Historia Natural*, Vol I, p. xxii

wisely with a certain aptitude for imprinting in the sand and soil the vestiges of the gentleness of the animal, or the signs of its indignation'.⁶⁷

As the above comments show, Mieg's religious concerns were shared by several of his compatriots. They were not, however, common to all natural history texts of the period. A notable dissenter from the religious paradigm was José de Urcullu, whose *Catecismo de Historia Natural* we discussed earlier in this chapter. Urcullu not only declined to extract the potential spiritual messages from his subject matter, but he purposefully distanced himself from the religious associations of his work's title. Anxious, he explained, to allay any 'scruples that the use of the word Catechism might occasion, applied as it generally is to books of Religion', Urcullu disclaimed any intention to proselytize. He had, he confessed, replicated the form of the catechism, in recognition of its educational properties, but he had shunned its usual content. Indeed, readers should note that 'this word [Catechism] is not exclusively consigned to religious materials, but that it signifies indiscriminately every book written in questions and answers'. It was, 'in this sense that it is currently used in all the educated Catholic countries of Europe'.⁶⁸

Given his explicit rejection of natural theology, it should not surprise us that Urcullu's interpretation of nature diverged to some extent from Mieg's – primarily in what it omitted. The different stances of the two writers are nicely illustrated by their descriptions of the anteater's tongue, which Mieg perceived as a divine gift and Urcullu merely as a useful device for procuring ants. Where Mieg cited the tongue of the anteater as evidence of 'the wisdom of the Creator', Urcullu confined himself to an account of its function. 'The Ants', he explained, believe that it is a piece of dead

⁶⁷ Garriga, *Descripción del Esqueleto*, p.v

⁶⁸ Urcullu, *Catecismo*, p.i

meat, and begin to climb up the tongue, becoming stuck to the viscous fluid that coats it. When the animal sees that there are a sufficient number ensnared, it withdraws the tongue and devours the Ants in an instant, and it continues in this manner until it has satiated its hunger'.⁶⁹

The contrasting religious positions of Mieg and Urcullu may be explained simply by their personal convictions. They may also reflect the differing political circumstances under which each man was writing. Urcullu, we should remember, penned his *Catecismo de Historia Natural* as a Spanish exile in London for an audience in newly independent, republican South America. This experience, as Roldán Vera suggests, may have encouraged religious tolerance, and was certainly in keeping with the religious neutrality of Ackermann's other output. Mieg, by contrast, wrote *Paseo* in the Catholic, absolutist Spain of the recently restored Ferdinand VII. In such a political climate, he was perhaps more inclined to preach orthodox religious views.

Whilst it would be tempting at this juncture to see Mieg's stance as symptomatic of Spanish fanaticism, it should be emphasised that natural theology was not a uniquely Spanish or a uniquely Catholic phenomenon, but had adherents throughout Europe. Carla Yanni contends that it was especially strong in nineteenth-century Britain.⁷⁰ Nancy Stepan ascribes a heightened interest in natural history in this country in part to 'the cultural authority of natural theology, which allowed people to see God's work in nature',⁷¹ and several contemporary British sources make explicit reference to the religious benefits of natural history. Sir Stamford Raffles' 1825 prospectus for the London Zoological Gardens, for instance, defined zoology as 'a

⁶⁹ Ibid., p.42

⁷⁰ Carla Yanni, *Nature's Museums: Victorian Science and the Architecture of Display*, London, Athlone Press, 1999, p.18

⁷¹ Nancy Stepan, *Picturing Tropical Nature*, London, Reaktion Books, 2001, p.32

most important branch of natural theology, teaching, by intelligent design and wonderful results of organisation, the wisdom and power of the Creator'.⁷² John Ripplingham, meanwhile, identified an increased respect for God as the most valuable use of a collection of natural history such as that on display in the London Museum and he had his fictional characters reflect directly upon the divine messages to be gleaned from the natural world. 'Have you not observed, my dears', Mr Wilson asks his offspring, 'in what a wonderful manner every bird is made so as to easily provide itself with the food it lives upon? If you have, then you must also perceive the great wisdom of God who made them'. The young Anna, suitably moved by this lecture, declares dutifully that 'I shall always feel a greater pleasure in reading the Psalms than I have ever done before', to which her father responds with approval. 'We shall generally find', he observes, 'that religion and the works of God [i.e. nature] assist and explain each other'.⁷³

Nurturing the Native

Natural theology influenced not only the interpretation of nature, but also its physical display. 'Early modern scholars', as Jorge Cañizares-Esguerra argues, 'thought that God best revealed His omnipotence through nature's play (artistry) rather than through nature's regularities'. They therefore collected those objects that struck them as bizarre or unusual.⁷⁴ Nineteenth-century museum curators, by contrast, 'wanted to observe specimens which were instructive about general principles of natural history

⁷² Thomas Allen, *A Guide to the Zoological Gardens and Museum; with a Brief Account of the Rise and Progress of the Zoological Society*, London, Cowie and Strange, 1829, pp.3-4

⁷³ Ripplingham, *Natural History*, p.65

⁷⁴ Jorge Cañizares-Esguerra, 'How Derivative was Humboldt?' in Schiebinger, Londa and Swan, Claudia (eds.), *Colonial Botany: Science, Commerce and the Modern World*, Philadelphia, University of Pennsylvania Press, 2005, p.155

– not nature’s quirks, God’s inexplicable moments of bad taste’.⁷⁵ They duly purged such unsightly monstrosities from their institutions.

The contrasting approaches of Antonio de Pinelo and Hermann Burmeister symbolise this shift in perspective. Where the sixteenth-century Peruvian stuffed his work *Paraiso en el Nuevo Mundo* (1645-1650) with numerous exotic monsters, in the belief that ‘the more wonders brought forth from the land, the more likely it had once been home to paradise’,⁷⁶ the Prussian-born director of the Museo Público de Buenos Aires swiftly cleansed his new domain of all deformed specimens following his appointment in 1862. ‘The phenomena and products of diseases have been removed from our Museum to be deposited in the new collection being formed by the Faculty of Medicine’, reported Burmeister. This was a desirable development, since such objects accorded better with the functions of a medical establishment than with those of a public museum, ‘dedicated, as I have said before, to the cult of the muses, which should adorn human life with their loveliness but should not offend the eyes by showing to them publicly the deformities and illnesses of the animal body’.⁷⁷

The trend from the abnormal to the typical was accompanied, according to Krzysztof Pomian, by a parallel movement from ‘the exceptional to the commonplace’ and from ‘the exotic to the native’. From his study of natural history collections in eighteenth-century Italy, Pomian concludes that increasing attention came to be devoted to ‘easily found objects, whose essential characteristic was that

⁷⁵ Yanni, *Nature’s Museums*, p.18

⁷⁶ Cañizares-Esguerra, ‘How Derivative was Humboldt?’, p.155 Pinelo summoned an impressive selection of monstrous beasts to prove the diversity of Peruvian nature. He mentioned Indians with tails, unicorns, ‘snakes with wings and arms’ and a creature that resembled a hydra. See Antonio de León Pinelo, *El Paraiso en el Nuevo Mundo*, Lima, 1943, Vol. II, pp.9, 46 and 76.

⁷⁷ Germán Burmeister, ‘Sumario sobre la Fundación y los Progresos del Musco Público de Buenos Aires’, *Anales del Museo Público de Buenos Aires para dar a conocer los objetos de Historia Natural nuevos o poco conocidos conservados en este establecimiento*, Vol I. Buenos Aires. Imprenta de ‘La Tribuna’, 1864, p.10

they were neither rare nor strange, but rather commonplace and banal'. Collectors also started to collate those objects that originated from their own regions, partly, no doubt, because such specimens were more readily accessible, but equally because knowledge of the local fauna and flora offered more potential uses. 'Accordingly, the inhabitants of Chioggia specialised in marine fauna and flora and the Paduans in objects from the Euganean Hills, while the nearby mountains kept the collections of Verona and Vicenza well stocked'.⁷⁸

In the Spanish context, a movement from the exceptional to the normal of the type outlined by Pomian may be detected in the wording of two similar royal decrees soliciting natural objects from viceroys and governors overseas. In the first of these decrees, issued by Philip V in 1712, Spain's first Bourbon monarch exhorted his imperial representatives to collect 'the rare, singular and extraordinary things that are to be found in the Indies... be they stones, minerals, animals or parts of animals, plants or any other genre that *is not common but extraordinary*'.⁷⁹ In the second decree, emitted in 1776 by Charles III, the collecting remit had widened, with overseas personnel being requested explicitly to gather that which was common as well as that which was rare. Charles' subjects, the document stipulated, should furnish the Gabinete with 'as many animals as they can find, big and small, of all genus, species and varieties, without considering whether they be ugly or beautiful, since in a museum that must contain all natural productions, the commonest stone deserves its place as much as the richest diamond'.⁸⁰

⁷⁸ Krzysztof Pomian, *Collectors and Curiosities, Paris and Venice, 1500-1800*, Cambridge, Polity Press, 1990, p.234

⁷⁹ 'Real Cédula expedida en Buen Retiro el 4 de agosto de 1712, sobre acumulación y remisión a España d muestras o particularidades pertenecientes a los tres reinos de la naturaleza'. Cited in José Manuel Pérez de Ayala, *Baltasar Jaime Martínez Compañón y Bujanda, Prelado Español de Columbia y el Peru, 1737-1797*, Bogotá, Biblioteca de la Presidencia de Colombia, 1955, pp.400-401 (my italics).

⁸⁰ Dávila, *Instrucción*, p.4

The shift towards the native and the typical – and its religious connotations – is also illustrated by a revealing passage in Mieg's *Paseo*, in which the Master and his Pupil scrutinise the contents of the Sala de Aves. Perusing the museum's ornithological display, the Pupil spots a chicken. He exclaims disdainfully that 'seeing it does not justify coming to a cabinet of natural history', since this humble creature cannot compete in wonder with the magnitude of the ostrich, the unworldly grace of the bird of paradise or the regal splendour of the peacock. In the event, the chicken in question redeems itself in the estimation of its sceptical observer when it turns out, upon closer inspection, to have four feet. Mieg's Master, however, having alerted his young charge to this unexpected deformity, scolds him for his initial indifference. He insists that, even had the chicken brandished only the standard complement of limbs, then it would still not have been devoid of interest. 'Our first care should be, as I understand it, to study the organisation and habits of the animals that surround us', lectures the Master, 'because they have a much more notable influence over our well-being than those foreign beings, and because it would certainly be irrational to know better the history of the ostrich, for example, or the monkey, than that of the chicken or the dog'. Common objects were, moreover, better illustrations of God's power than alien ones. 'It frequently happens', contends the Master, 'that the most usual objects present to the observer more useful applications, more opportunities to admire divine goodness and wisdom than those which are strange or rare'.⁸¹ This was just as well, since, by 1818, Spain's cherished American colonies were in the throes of independence, and the opportunities for acquiring exotic specimens had been severely curtailed.

⁸¹ Mieg, *Paseo*, pp.33-34



Fig.2: A chicken with three legs, from Juan Bautista Bru *Colección de Láminas que representan los animales y monstruos del Real Gabinete de Historia Natural de Madrid*, Madrid, 1786

Conclusion

The study of natural history was deemed a useful and wholesome occupation for all strata of society. Clavijo-Fajardo classed it as ‘a study so important and so suitable for all men that there is no class or sex for whom it is not appropriate’.⁸² Mieg concurred, remarking that, whilst ‘the preparation and conservation of mammals and bird demands, in truth, much attention, and patience and skill to which many persons are not susceptible...the collection of minerals and plants, that of insects, shells, etc, is neither difficult nor costly’, and could be performed by individuals with minimal prior training.⁸³

Eighteenth and nineteenth-century savants dispensed information about the natural world because they adjudged it morally uplifting, and because they recognised its potential social and economic applications. Paula de Vos has emphasised the

⁸² Clavijo-Fajardo, *Historia Natural*, p.lxvi

⁸³ Mieg, *Instrucción*, p.33

utilitarian orientation of Spanish natural history in the collection of natural objects, which, as she demonstrates, tended to be solicited for their alimentary, material, and above all medicinal properties.⁸⁴ Much the same rationale underlay the drive to propagate natural knowledge, which aimed to make farmers more productive, doctors more effective and travellers more observant, and which elicited the wholehearted support of contemporary reformers. Clavijo alleged, for example, that the traveller ignorant of natural history would overlook the riches of the land in which he disembarked. Conversely, the same individual, equipped with the rudiments of natural knowledge, 'would observe the means of raising and propagating the useful animals and insects, the cultivation of the foreign trees and plants that could perhaps be naturalised in his country, their virtues and uses, the greater or lesser perfection of agriculture and the most advantageous method of exploiting the mines'. He would, Clavijo conjectured, 'enrich his understanding and [more importantly] be useful to his country'.⁸⁵

The natural history museum was the ideal location in which to study nature, because it gathered a wide spectrum of specimens in a single place. Visitors could survey these objects at their leisure. They could familiarise themselves with their form and uses, and, if the artefacts were properly labelled, suitably positioned and methodically arranged, they could learn their names, their origins, and how they related to one another. By accumulating specimens from across the globe, the museum obviated the need for arduous excursions to distant lands. It enabled visitors to visualise the species they had read about in books – an essential element in the

⁸⁴ Paula de Vos, 'Natural History and the Pursuit of Empire in Eighteenth-Century Spain', *Eighteenth-Century Studies*, Vol.40 no.2, 2007, pp.209-239

⁸⁵ Clavijo, p.xxxvii

learning process – and it permitted them to observe at close quarters animals that were too vicious, too boisterous or simply too small to be examined in the wild.

Clavijo-Fajardo mustered precisely these arguments in favour of natural history cabinets, remarking that without them ‘we could not see nature other than dismembered...nor could we form the faintest idea of its almost infinite number [of productions], nor consider the relations and reciprocal correspondence that these productions have amongst themselves, nor the differences that characterise them’.⁸⁶

The French naturalist Pierre Boitard substantiated this view in his *Manuel del Naturalista Disector*, published in Spanish in 1833. Thanks to the wonders of taxidermy, reflected the Frenchman, ‘the studious naturalist can compare the *tiger* of India with the *panther* of America; the enormous *reptile* fighting with the *lion* in the scorching deserts of Africa with the almost lifeless *snake*, barely dragging its stupefied body through the swampy lagoons of northern Europe. From the interior of his cabinet, he can undo the errors of the traveller, paralysed by his love of the marvellous, and, like Buffon, he can see better without distancing himself from the domain and presence of his parents, than those who traverse the globe in order to see and study’.⁸⁷

⁸⁶ Clavijo-Fajardo, *Historia Natural*, p.xiv

⁸⁷ Pierre Boitard, *Manual del Naturalista Disector, o Arte de disecar y empajar los animales y de conversar los vegetales y minerales. Escrita en Francés por los Sres. Boitard y Canivet, Naturalistas. Traducida de la Segunda Edición, corregida y aumentada por Don Santiago de Alvarado y de la Peña, escribano de S.M. y del ilustre Colegio de Madrid, autor y editor de varias obras de literatura y de jurisprudencia*, Madrid, 1833, Imprenta de D. Tomás Jordán, p.v

Chapter 4: Peripheral Vision

In the *Personal Narrative* of his epic South American journey, the Prussian savant Alexander von Humboldt recorded an unexpected and rather surreal encounter. At the remote settlement of Calabozo, deep in the desolate Venezuelan llanos, Humboldt stumbled, to his unconcealed surprise, upon 'an electrical machine', complete with 'large plates, electrophori, batteries [and] electrometers'. He also stumbled upon the machine's proud creator, one Señor Carlos del Pozo, 'a man who had never seen any instrument, who has no person to consult and who was acquainted with the phenomenon of electricity only by reading the treatise of [Sigaud] de la Fond and [Benjamin] Franklin's Memoirs'. Astonished to discover such a sophisticated piece of apparatus in such 'vast solitudes', Humboldt could not disguise his unbounded admiration for its creator. Señor del Pozo, the Prussian surmised, must be an 'enlightened and ingenious man' to have constructed this impressive machine entirely on his own initiative. He must also possess great personal determination and moral fibre in order to have persevered with his challenging project in the face of apparently overwhelming odds. 'It is easy to judge what difficulties Señor Pozo had to encounter since the first works upon electricity had fallen into his hands', reflected Humboldt. It was a testament to the Venezuelan's persistence 'that he had the courage and resolve to procure himself by his own industry all that he had seen described in his books'.

If this chance encounter in the plains was a revelation to Humboldt, then its impact upon del Pozo must have been even more profound. Prior to the arrival of Humboldt and his companion Aimé Bonpland, the Venezuelan had never exhibited his precious machine to anyone with a modicum of scientific training,

but had 'enjoyed only the astonishment and admiration produced by his experiments on persons destitute of all information, and who had never quitted the solitude of the llanos'. Humboldt presumed, on this basis, that del Pozo would welcome 'the opinions of two travellers who could compare his apparatus with those constructed in Europe'. His supposition proved correct, for the Venezuelan relished the opportunity to inspect the Europeans' staggering selection of precision instruments and watched in awe as Humboldt performed physiological experiments on the local frogs, who probably took a rather dimmer view of proceedings. 'Señor del Pozo could not contain his joy on seeing for the first time instruments which he had not made, yet which appeared to be copied from his own', reported the Prussian. The experience of meeting a European savant was seemingly a cathartic one for del Pozo, and a source simultaneously of excitement, inspiration and much needed reassurance.¹

Del Pozo's situation epitomised the unenviable predicament of the peripheral savant. Marooned on the margins of the Spanish empire, the Venezuelan suffered from an acute shortage of scientific books and equipment. No expert supervised or advised him. He had nobody to applaud his achievements or to assuage his doubts, and, until Humboldt's miraculous appearance on the scene, no educated companion with whom to discuss his work. Under such unpromising circumstances, del Pozo was compelled to rely upon his own initiative and ingenuity. His accomplishments represented a triumph of dedication over adversity, and an admiring Humboldt portrayed him reverently

¹ Alexander von Humboldt, *Personal Narrative of Travels to the Equinoctial Regions of America during the years 1799-1804*, Translated and Edited by Thomasina Ross, London, 1852, Vol. II, pp.111-112

as a beacon of enlightenment, radiating learning in the 'vast solitudes' of the Llanos.

This chapter explores the pursuit of the natural sciences on the imperial periphery. It assesses the problems encountered by men of science in late colonial Spanish America. It examines the factors that inhibited scientific research and it considers how these impediments impacted upon the scholarly self-confidence of American-based savants. The following chapter explores, conversely, the scientific assets that creole naturalists *did* enjoy, and the arguments they mustered to enhance their credibility. It suggests that men of science on the imperial periphery compensated for their lack of formal training and the relative poverty of their equipment by emphasising their experience of and proximity to American nature. It also examines how some creoles questioned the applicability of old-world theories to new-world fauna and flora, subverting the models and systems that governed contemporary science.

Books and Barometers

Naturalists working on the margins of the Spanish empire recited a litany of woes. They depicted themselves as beleaguered and isolated savants, battling valiantly against apathy, inertia and outright hostility. They despaired that their measurements were inaccurate, their instruments imperfect and their ideas outdated. They envied their European counterparts, who enjoyed a level of fame and resources of which they could only dream, and they conjured a melancholy picture of embattled savants, passionate about their research but perpetually thwarted by almost insurmountable obstacles.

Painfully aware of the constraints under which they operated, naturalists on the imperial periphery explicitly contrasted their unenviable situation with that of more favoured European colleagues. Francisco José de Caldas, writing to Humboldt in 1802, juxtaposed their respective positions. 'What a difference there is in our work!' exclaimed the New Granadan. 'Humboldt, full of enlightenment, wise, in possession of excellent instruments and accompanied by Bonpland, that is to say, associated with Linnaeus; Caldas ignorant, obscure, with miserable instruments and alone'.² The Spaniard Azara, who languished in Paraguay for twenty years, professed similar distress in a letter to his elder brother Nicolas. Comparing his fate with that of his sibling, who was then ambassador to France, Azara sketched a sober picture. 'You have lived in the great world, and, through your elevated employments, talents, works and virtues, you have made yourself respected in Spain and beyond', reflected Azara. 'But I...have spent the best twenty years of my life in the most remote corner of the earth, forgotten even by my friends, without books or rational conversation and travelling continually through immense and horrifying deserts and forests, communicating only with the birds and the beasts'.³

One problem that afflicted Creole naturalists was the difficulty in obtaining scientific books to direct and guide their studies. This obstacle was articulated with particular poignancy by Caldas, who lamented the dearth of essential scientific texts in his native New Granada and interpreted their absence as a source of national disgrace. Writing to his friend Santiago Arroyo, Caldas

² Letter from Caldas to Humboldt, 17 November 1802, in Chenu, *Caldas*, p.201

³ Azara, Vol. I, 'Dedicación'

questioned what contemporary Europeans would think if they knew of the colony's bibliographical poverty.

If we were to say in Europe that there was a people with nearly three hundred years of existence, under the domination of a civilised nation...that there are schools, a university, doctors who inundate the towns, and if one were to say that amongst this people one cannot find a copy of Linnaeus' *Filosofia Botánica*, that [the work of the] the *Count of Buffon* is rare, that one scarcely sees master works of any genre, would they not believe that we were speaking to them of the Kalmaks or the Tartars, or perhaps even of the Lapps?'⁴

Caldas, who had elsewhere caricatured the Lapps as an 'abject people', must have shuddered at the prospect.⁵ The New Granadan was, indeed, so incensed by the inadequacy of his book supply that he reprised the theme in a later letter and once more chastised the intellectual backwardness of his homeland. 'How certain it is that we are two centuries behind Europe!' exclaimed Caldas. 'When we are presented with a happy idea in the *few old books* that find their way into our hands, it is already two hundred years since it was put into practice amongst the civilised nations'.⁶

⁴ Letter from Francisco José de Caldas to Santiago Pérez Arroyo, 20 March 1801, Chenu, *Caldas*, p.84

⁵ Francisco José de Caldas, 'Del Influjo del Clima sobre los Seres Organizados', in *Obras*, p.87. Ironically, the original citation was lifted by Caldas from the Spanish translation of Buffon's work, demonstrating the New Granadan's subsequent access to this text.

⁶ Letter from Francisco José de Caldas to Santiago Pérez Arroyo, 6 October 1801, Chenu, *Caldas*, p.132 (my italics). Caldas also grumbled about the difficulty of obtaining a copy of Linnaeus' *Filosofia Botánica* in America. He questioned whether it was 'possible that in the entirety of New Granada there is not one copy of this classic book' and concluded that 'if Mutis does not possess one, then I doubt that there is'. See Letter from Caldas to Santiago Pérez Arroyo, 20 January 1801, in Academia Colombiana de Ciencias Exactas, Físicas y Naturales (ed.), *Cartas de Caldas*, Bogotá, 1979, p.55

Caldas was not the only American savant to bemoan the insufficiency of books in colonial Spanish America. At the opposite end of the continent, in the city of Montevideo, the naturalist Dámaso Antonio Larrañaga suffered similar difficulties. A recent convert to the delights of botany, Larrañaga penned a rather desperate letter to the botanical society of Barcelona in which he summarised the impediments that had thus far obstructed his studies. 'I have not known or communicated with any botanist', bewailed Larrañaga. '[H]ere there are no herbariums or gardens, and, what is most painful to me, *Books are very rare and expensive*'.⁷

Little better was the situation of the self-taught Spanish zoologist Félix de Azara, dispatched to the Río de la Plata in 1781 to settle a border dispute with Portuguese-governed Brazil. Since Azara's passion for natural history germinated *after* his arrival in the Americas, he encountered the same problems in accessing books as his creole counterparts and experienced similar distress. In fact, Azara was obliged to subsist upon a single book – Buffon's *Histoire Naturelle* – for much of his time in the Americas. Not only was this work insufficient, but the copy with which Azara was supplied by the Viceroy, the Marques de Loreto, was José Clavijo-Fajardo's Spanish translation, rather than the original French version, and, according at least to Azara's French critics, contained some defective illustrations. When, for instance, Azara stigmatised the depictions of bats in Buffon's text as 'deserving of the most rigorous censure', the translator of his *Essais sur l'Histoire Naturelle des Quadrupèdes de la Province du Paraguay*, Moreau-Saint-Méry, sprang to the defence of his compatriot, insisting that 'this reproach applies to the plates of the Spanish [of

⁷ Draft of a letter from Dámaso Antonio Larrañaga to the botanists of Barcelona, to be delivered by a mutual acquaintance, Don Miguel Antonio Vilardebó, in Gallinal, Vol. III, p.252 (my italics)

the *Histoire Naturelle*], rather than to those in the French edition that I have designated'.⁸

One may of course question whether the availability of books was really as dire as these accounts suggest. Humboldt, visiting Bogotá in 1801, scrutinised the personal library of José Celestino Mutis and pronounced it one of the best he had seen. 'After that of [Joseph] Banks in London', Humboldt informed his brother Wilhelm, 'I have never seen a botanical library as large as that of Mutis'.⁹ Caldas, as a protégé of the Spanish botanist, had access to this collection of books, at least in the later stages of his career. He may also have benefited from a broadening and an increasing secularisation in the trans-Atlantic and internal book trade, which, according to Renan Silva, was both more extensive and more varied than has generally been thought, and which was, moreover, not confined to Santa Fé. 'In other cities and populations', contends Silva

for example Popayán [Caldas' home town] we note the existence of "shops" in which, beside the most common objects of daily use, one may observe the role of books and leaflets, in which the works of devotion and piety continue to predominate, but in which there already begin to figure another class of texts that is not limited to Latin vocabularies and to

⁸ Félix de Azara, *Essais sur l'Histoire Naturelle des Quadrupèdes de la Province du Paraguay*, trans. Moreau-Saint-Méry, Paris, Charles Pougens, 1801, p.268. Azara eventually consulted the French version of Buffon in 1798, when the Argentine Pedro Cerviño lent it to him. The Spaniard thanked Cerviño for the work in a letter and pronounced it to be of use because 'it contains Daubenton's [anatomical] descriptions, which shed a lot of light on those of Buffon'. See Letter from Azara to Pedro Cerviño, 31 March 1798, in Alvaro Mones and Miguel A. Klappenbach, *Un Ilustrado Aragonés en el Virreinato del Río de la Plata: Félix de Azara (1742-1821)*, Montevideo, 1997, p.183

⁹ Renan Silva, *Los Ilustrados de Nueva Granada*, p.245. According to Juan Pimental, Mutis' library extended to around 9,000 volumes and included the most recent edition of Linnaeus' *Systema Naturae* and his *Philosophia Botanica*, which the Spaniard had received from the Swedish botanist Klas Alströmer whilst in Cádiz. See Juan Pimental, *Jorge Juan, Mutis, Malaspina, Viajeros Científicos: Tres Grandes Expediciones al Nuevo Mundo*, Madrid, Nivola, 2001, pp. 84 and 91

primers; shops that include as well amongst their merchandise small scientific instruments for the work of the naturalist and experimenter.¹⁰

It is also reasonable to assume that conditions fluctuated throughout the Spanish empire, with some regions being better served than others in bibliographic terms. Where Caldas grumbled at the lack of reading matter in his native Popayán, for instance, the Peruvian Unanue advised 'he who wants to instruct himself extensively on the authors who have cultivated botany' to 'consult the *Biblioteca* by Séguier and Montalbani, the *Isogoge* by Tournefort, the prologue by Don José Quer in the *Flora Española* and that by Doctor Barnades in his little work on the *Principios Botánicos*' - all of which were presumably readily available in the Peruvian capital.¹¹ Where Larrañaga described himself as living 'in these most remote towns of South America, in which scarcely a book of Natural History used to arrive',¹² meanwhile, the Mexican Alzate advertised the *Parte Teórica del Curso Elemental de Botánica*, 'formed on the orders of His Majesty for the benefit of the Disciples and Aficionados of this important Science'. Alzate indicated that this work could be purchased for one peso at the offices of the *Gazeta de México*,¹³ and he claimed elsewhere that Valmont de Bomare's *Dictionnaire raisonné universel d'histoire naturelle* (first published 1764), was 'to be found in almost all the libraries of lovers of the study of nature' in Mexico. These examples suggest,

¹⁰ Ibid., p.238

¹¹ Unanue, 'Introducción a la Descripción Científica de las Plantas del Perú' in Jean-Pierre Clément (ed.), *El Mercurio Peruano, 1790-1795*, Vol. II, Frankfurt, Vervuert, 1998, p.95

¹² Letter from Larrañaga to Bonpland, 26 February 1818, Gallinal, *Escritos*, p.261

¹³ *Gazeta de México del Martes 17 de Junio de 1788*, in *Gazetas de México, Compendio de Noticias de Nueva España que comprehenden los años de 1788 y 1789*, Vol.III, Mexico City, Felipe de Zuñiga y Ontiveros, p.80

unsurprisingly, that scientific literature and equipment were more readily obtainable in major colonial centres such as Mexico City than in isolated backwaters like Montevideo.

Whilst these developments temper the uniformly bleak picture painted by Caldas and his contemporaries, the position of the peripheral naturalist remained, nevertheless, far from ideal. Azara – admittedly a rather extreme example – really does seem to have survived on the works of a single author – Buffon. True, the Spaniard cited a number of other authors in *Viajes por América Meridional*; he quoted an article by Antonio Zea on the waterfall at Tequendama, published in the *Anales de Ciencias Naturales*,¹⁴ and he also referred to Tadeo Haenk's study of the province of Cochabamba.¹⁵ Both of these texts, however, had been read by Azara *after* his return to Spain, and knowledge of their contents thus arrived too late to assist him with his fieldwork in the Río de la Plata.

Caldas' situation was marginally better. Yet the New Granadan fretted constantly that the books in his possession were not up date and he agonised that his discoveries had been superseded in Europe. A passage in his *Memoria sobre un nuevo método de medir la altura de las montañas por medio de termómetro y el agua* epitomised this nagging fear. Detailing a mathematical formula he had devised for determining the height of mountains using only a thermometer and boiling water, Caldas remarked bitterly that 'very little or nothing has been written – or, perhaps I should rather say, *very little has come into my hands* – on

¹⁴ Azara, *Viajes*, Vol. I, p.49

¹⁵ *Ibid.*, p.35

this particular'.¹⁶ Caldas speculated, pessimistically, that some European savant had probably anticipated his discovery. He exuded frustration. 'How sad is the fate of an American!' exclaimed the New Granadan. 'After many labours, if he comes to find something new, the most that he can say is: *it is not in my books*'.¹⁷

Inadequate access to books was not the only difficulty that plagued creole naturalists; the acquisition and maintenance of scientific instruments presented similar problems. As Mauricio Nieto has commented 'the comprehension of the world, in addition to being a conceptual problem is a technical problem', as a result of which 'scientific instruments are as necessary in order to be able to form part of the community of the natural sciences as are bibliographical references'.¹⁸ Creole naturalists duly struggled to obtain the precision instruments that they required in South America, where such technology was not readily available. They were obliged either to import coveted apparatus from Europe – a slow and costly process – or to manufacture it for themselves.

Emblematic of this predicament is Caldas, whose correspondence is littered with petitions for instruments and expressions of gratitude following their arrival. The American opened one letter to his patron José Celestino Mutis by confirming his receipt of 'two good barometer tubes'.¹⁹ He closed another with an even more exuberant outpouring of appreciation - 'How can I paint for you my recognition and my happiness that fortunate day on which I received the

¹⁶ Francisco José de Caldas, 'Ensayo de una Memoria sobre un Nuevo Método de Medir la Altura de las Montañas por medio del Termómetro y el Agua Hirviendo', in *Obras Completas*, p.155 (my italics)

¹⁷ *Ibid.*, p.158

¹⁸ Mauricio Nieto Olarte, *Orden Natural y Orden Social: Ciencia y Política en el Semanario del Nuevo Reino de Granada*, Madrid, C.S.I.C, 2007, p.99

¹⁹ Letter from Caldas to José Celestino Mutis, 5 August 1801, in *Chenu Caldas*, p. 121

telescope and the chronometer?’²⁰ – and he could hardly contain his delight when Humboldt offered to sell him an astronomical instrument. ‘Baron Humboldt proposed to me the sale of his excellent quarter circle’, rejoiced Caldas. ‘My heart pulsated upon hearing this advantageous offer [and] a multitude of thoughts filled my mind in that moment. Will I come to possess this masterpiece of [the renowned instrument-maker] Bird?’²¹

Sometimes sophisticated instruments proved unattainable, or the wait intolerable. When this occurred, Caldas manufactured his own equipment, as his correspondence again attests. Writing to his close friend Santiago Pérez Arroyo, the creole mentioned that he had recently ‘constructed a quarter circle of wood of seventeen French thumbs in radius’ which ‘he had divided with as much precision as was possible’.²² In a letter to the Viceroy of New Granada, Antonio Amar y Borbón, meanwhile, Caldas summarised his scientific career, describing how, as an adolescent, he developed a passion for astronomy. ‘In the silence and obscurity of Popayán I tried to form for myself a quarter circle, like that described by the excellent Jorge Juan in his *Observaciones Astronómicas*’, reminisced Caldas. ‘This wise Spaniard, a credit to the Nation and to the sciences, was my guide amidst the dense shadows that surrounded me. Thanks to

²⁰ Letter from Caldas to José Celestino Mutis, 7 November 1802, in Chenu *Caldas*, p.199

²¹ Letter from Caldas to José Celestino Mutis, 6 May 1802, in *Cartas de Caldas*, p.174. Elsewhere, Caldas thanked Mutis for the delivery of several precision instruments, including a telescope, a chronometer and a microscope. He regretted, however, that a thermometer sent to him by the Spaniard was broken in transit, a significant loss, since ‘in Quito it is almost impossible to find a similar instrument’ - a sad reflection upon ‘the state of physics and the useful sciences in this populous city’. See Letter from Caldas to Mutis, 7 November 1802, in *Cartas de Caldas*, p.204

²² Letter from Caldas to Santiago Pérez Arroyo, 21 January 1802, in Chenu *Caldas*, p.151

an obstinate persistence, I formed my wooden quadrant, which I still preserve in Popayán, and with it I began my observations'.²³

The creoles were not, of course, absolutely without scientific instruments, in spite of Caldas' repeated protestations to the contrary. They were, however, relatively impoverished in instrumental terms, a fact that was forcibly impressed upon them by their encounters with European travellers such as Humboldt, who, according to David Brading, brandished 'no less than thirty-six of the latest instruments made in Paris, so as to enable him to take observations of latitude, longitude, altitude, temperature, air pressure and magnetic readings'.²⁴ The New Granadan Jerónimo Torres, recounting his meeting with Humboldt, reported that 'I have seen his instruments, which we knew of here only by the word of mouth or from the press'.²⁵ Caldas, meanwhile, listed the Prussian's fantastic array of apparatus with quasi-religious reverence. 'He has offered me his books', rejoiced the creole, and 'his instruments and the famous chronometer have been at my disposition. In meteorology I have seen Luc's hygrometer...the eirometer, the eudiometer; I know their use and their results'.²⁶ Such encounters both invigorated and depressed creole experimenters like Caldas, Torres and Del Pozo, who were offered a tantalising glimpse of instruments that they themselves would thereafter be unable to obtain, or at least only at great personal expense and difficulty.

²³ Francisco José de Caldas, 'Informe al Virey, 18 July 1809', in *Obras Completas*, p.214

²⁴ David A. Brading, *The First America: The Spanish monarchy, Creole patriots and the Liberal state 1492-1867*, Cambridge, Cambridge University Press, 1991, p.502

²⁵ Silva, *Los Ilustrados de Nueva Granada*, p.201

²⁶ Letter from Caldas to Santiago Pérez Arroyo, 21 January 1802, in Chenu, *Caldas*, p.147

Solitary Savants

Inadequate access to books and equipment was compounded by the lack of scholarly companions, qualified technicians and able instructors. Creole naturalists complained repeatedly about the dearth of competent taxidermists, painters or individuals to assist them in making astronomical observations. They also bemoaned the absence of European-style academies and scientific societies in which to discuss, refine and disseminate their observations and ideas.

The Uruguayan naturalist Larrañaga referred to these problems in a letter to the French botanist Saint-Hilaire, when he recounted his 'distress at seeing myself deprived for such a long period of my life of masters who would teach me, and with whom I could consult my doubts'.²⁷ The Mexican savant José Antonio Alzate declared that 'I have had no masters or support [in my botanical studies] other than my application',²⁸ whilst Azara apologised for the lack of illustrations in his work on Paraguay's quadrupeds, attributing it to the scarcity of qualified artists in the locality. 'Where I worked, and within a radius of four hundred leagues, there was no-one who knew the least thing about drawing', explained Azara, hence 'everything that I produced depended upon me'.²⁹

Perhaps most vocal on the lack of adequate support personnel was Caldas, who expatiated at length on the difficulties posed by non-existent or unsuitable assistants. Writing to his friends Juan José Hurtado and Antonio Arboleda, for example, the New Granadan snorted that 'there is no-one in Quito

²⁷ Letter from Larrañaga to Auguste Sainte-Hilaire, 16 February 1821, in *Escritos*, Vol. III, p.279

²⁸ 'Carta satisfactoria, dirigida a un Literato por D. Joseph de Alzate, Autor de la Gazeta Literaria, sobre lo contenido en el suplemento a la de México de 16 de Mayo en 1788', *Gazetas de México*, Suplemento a la Gazeta de México del Martes 24 de Junio de 1788, p.102

²⁹ Azara, *Quadrúpedos*, p.iv

who knows what a *petal* is, nor the scientific name of any plant', as a result of which 'I have to do everything for myself'.³⁰ Elsewhere, in an 1808 report on his contribution to Mutis' Botanical Expedition, Caldas complained that he had had to do all of his botanical illustrations 'with my own hand, because nobody would give me even a painter', and he grumbled that the lack of a competent assistant had retarded his astronomical observations. 'I add that I was never able to persuade [Mutis] to give me a co-observer', the naturalist muttered sourly, 'and I have found myself in the sad necessity of teaching some principles of astronomy to my servant'.³¹

Such intellectual deprivations had two significant effects. Firstly, they perpetuated the romantic image of the audacious autodidact, who triumphed over seemingly insurmountable obstacles thanks to his innate genius and his unquenchable thirst for knowledge. Secondly, they increased the peripheral naturalists' craving for European connections and approbation, leading many of the latter to construe their brief encounters with old-world savants as moments of epiphany and major turning points in their scientific careers.

The image of the self-taught savant arises with some regularity in depictions of Spanish American savants. The Viceroy of New Granada, Pedro Mendinueta, for example, writing a report to his successor in 1803, regretted that those of his subjects who possessed some knowledge of the 'useful sciences' 'may be said to have acquired it in their own cabinets, through private effort and aided by their own books, rather than in public colleges and classrooms', where

³⁰ Letter from Caldas to Juan José Hurtado y Arboleda and Antonio Arboleda, 6 May 1802, *Cartas de Caldas*, p.178

³¹ Letter from Caldas to the Secretary of the Viceroyalty, 30 September 1808, in Chenu, *Caldas*, pp.225-227

theology and jurisprudence continued to dominate.³² The Briton Charles Hamilton Smith paraded the untutored Azara as a ‘fine example of what a person of ordinary education and intelligence may achieve by dint of steadiness and perseverance’,³³ whilst Humboldt saluted the New Granadan Caldas as ‘a prodigy in astronomy’ and pondered what feats the creole would have achieved had he had the good fortune to live in a more congenial environment. ‘Born in the darkness [ténèbres] of Popayan, having never travelled further than Santa Fé [de Bogotá, [Caldas] has constructed for himself barometers, a sector, and a quarter circle’, marvelled Humboldt. ‘What would this young man not accomplish in a country where there are means, and where he did not have to learn everything for himself!’³⁴

If Humboldt’s comments typified the European reaction to meeting a self-taught Spanish American savant, then Caldas’ response to the same encounter indicates the creole naturalist’s desire for guidance, reassurance and recognition. Writing to his friends Santiago Pérez Arroyo and Antonio Arboleda in January 1802, shortly after his first contact with Humboldt and Bonpland, Caldas portrayed the experience as a cathartic one. He savoured the opportunity to have his own work published alongside that of the Prussian. He cherished the chance to act as a ‘conductor and communicate to my friends all that I am able to imbibe from this unique man’, and he characterised his meeting with Humboldt in dramatic terms as a time of enlightenment, in which his work was validated, his

³² ‘Relación del estado del Nuevo Reino de Granada, presentado por el Excmo. Sr. D. Pedro Mendinueta a su sucesor el Excmo. Sr. D. Antonio Amar y Borbón. Año de 1803’ in E. Posada y P.M. Ibáñez, *Relaciones de Mando: Memorias presentadas por los gobernantes del Nuevo Reino de Granada*, Bogotá, Imprenta Nacional, 1910, p.492

³³ Hamilton Smith, ‘Memoir of Don Félix de Azara’, p.23

³⁴ Letter from Caldas to Santiago Pérez Arroyo, 6 March 1802, Chenu, *Caldas*, p.160

fears assuaged and his knowledge substantially enhanced.³⁵ 'How much have I learned in eighteen days...!' stuttered Caldas. 'In astronomy I hardly know myself; a dense mist has been dissipated before my eyes, and since I already had many works begun and almost concluded, I was only lacking the hand of a master to give them the ultimate perfection'.³⁶ European savants thus admired their colonial colleagues for their ingenuity and determination, whilst creoles looked to Europe for acceptance, instruction and vindication. 'What an honour, what glory for me...to see my works appear before the universe accompanied by those of the Baron', gushed Caldas, delighted to be associated with an acknowledged old-world expert.³⁷

The validity of the heart-wrenching image of the beleaguered peripheral savant is, of course, open to question. In their article 'Félix de Azara: The Myth of the Isolated Genius in Spanish Science', Thomas Glick and David Quinlan challenge such excessively bleak depictions. They intimate that Azara and his cohorts did not germinate spontaneously in infertile soil as a result purely of their own brilliance, and they conclude that the isolation of which Spanish and Spanish-American men of science complained was primarily psychological in nature. 'We believe, in short, that the myth of the isolated genius in Spanish science corresponds not so much to the objective reality of the practice of science by its most outstanding Spanish exponents, as to the *perception* of the role of science in Spanish society as perceived by participants and observers alike'.³⁸

³⁵ Letter from Caldas to Antonio Arboleda, 21 January 1802, Chenu, *Caldas*, p.153

³⁶ Letter from Caldas to Santiago Pérez Arroyo, 21 January 1802, Chenu, *Caldas*, p.146

³⁷ Letter from Caldas to Antonio Arboleda, 21 January 1802, Chenu, *Caldas*, p.150

³⁸ Thomas F. Glick and David M. Quinlan, 'Félix de Azara: The Myth of the Isolated Genius in Spanish Science', *Journal of the History of Biology*, Vol.8, no.1, 1975, pp.67-79

Whilst this may have been the case, however, peripheral naturalists were *relatively* disadvantaged when it came to the execution and dissemination of their work, and ‘their isolation and limited access to European publications not only made the practice of European science more difficult, but it increased their faith in the magnitude and the power of European scientific knowledge’.³⁹ Caldas lacked the extensive network of correspondents enjoyed by savants like Humboldt, and the creoles’ imperfect access to the latest literature and equipment available in Europe nurtured fears of backwardness and imprecision, even when these were unfounded.⁴⁰

There is also some evidence that European observers, though often impressed by the achievements of colonial savants, did occasionally highlight certain failings in their work. They intimated that these failings might have been averted had the latter enjoyed access to the most up-to-date equipment or scholarly forums in which to refine their theories. They also attributed certain theoretical and stylistic faux pas explicitly to the peripheral location of the individuals who had committed them.

The European reception of Azara’s *Apuntamientos sobre los Cuadrúpedos de Paraguay* (1802) offers a good example of these censures. Introducing his English translation of the work, William Perceval Hunter remarked that ‘the numerous works of natural history which have since the beginning of the present century issued from the press have not been less

³⁹ Mauricio Nieto Olarte, *Remedios para el Imperio*, p.262

⁴⁰ According to Charles Minguet, Humboldt wrote more than 35,000 letters during his lifetime, 150 of which date from the time of his South American expedition (1799-1804). Mauricio Nieto contends that Humboldt’s network of correspondents was ‘indispensable for the achievement of his scientific objectives’, and he notes how Caldas’ correspondents, by contrast, constituted a relatively small number of individuals ‘confined to a few cities in New Granada’. See Nieto, *Orden Social*, pp.276-279

distinguished for the immense body of new and original facts they have presented than for the animated, brilliant and often masterly style in which they have been narrated'. The Briton cautioned his readers not to expect such exquisite prose from Azara. He conceded that 'those...who in this work look for the chaste and classical style of Cuvier, the poetic diction of Wilson, the gorgeous colouring and sonorous cadences of Buffon and von Humboldt, the elegant simplicity of White or the nervous eloquence and brilliant bursts of enthusiasm so delightful in the works of Audubon and Le Vaillant will be disappointed'. He prepared his audience instead for 'a plain, unvarnished narrative of facts, professedly given as notes or rough sketches – a style simple indeed – and not always devoid of vigour, but seldom elegant and generally coarse'.⁴¹

Azara's French critics also pounced on his stylistic blunders, though they were less concerned about the lyricism of the Spaniard's prose and more troubled by his intemperate treatment of their countryman Buffon, whose conclusions he frequently disputed. Charles Anathuse de Walckenaer, the translator of *Viajes por la América Meridional*, objected to Azara's overly strident denunciations of Buffon's mistakes, which he felt 'gives his style an abrasiveness and a decisive tone that puts it at a disadvantageous contrast to the moderation that scientific investigations demand, in which the most well educated and experienced practitioner is not immune from falling into error'.⁴² Mérédic-Louis-Elie Moreau de Saint Méry, translator of *Quadrúpedos*, likewise winced at some of the Spaniard's expressions. The Frenchman admitted that many of Azara's criticisms

⁴¹ William Perceval Hunter, *The Natural History of the Quadrupeds of Paraguay and the River La Plata*, Edinburgh, A. and C. Black, 1838, p.xi

⁴² Azara, *Viajes*, p.13

of Buffon had substance. He regretted, nevertheless, the frequency of these tirades and judged some of the Spaniard's comments 'a little severe' for the genre of natural history.⁴³

What was at issue in both of these cases was scholarly etiquette. Disagreement was clearly an essential element of all forms of scientific research, yet contemporary codes of conduct enshrined the ability to 'demur without discourtesy', as vital to the continuation of amicable academic debate, and tacitly precluded any comments that impugned the honour or credibility of a participant. In practice, this meant that men of science had to finesse their criticisms in order to minimise offence. They had to refrain from using incendiary terms such as 'error' or 'falsity' and to guard against any expressions that questioned not merely the accuracy of an observation, but the integrity and truthfulness of the observer.⁴⁴

Azara flouted these unwritten rules when he unceremoniously mauled Buffon and his informants. His blunt rebuttals scandalised sensitive French reviewers, and one, Charles Nicolas Sigisbert Sonnini de Manoncour, felt obliged to interject with squeals of indignation throughout his 1809 translation of the Spaniard's *Pájaros*. On one occasion, for instance, amidst a heated debate as to whether ynambu birds perched in trees (Sonnini thought they did, Azara was adamant that they did not), the French ornithologist accused Azara of 'having

⁴³ Félix de Azara, *Essais sur l'Histoire Naturelle des Quadrupèdes de la Province du Paraguay*, trans. Moreau-Saint-Méry, Paris, Charles Pougens, 1801, p.xxii. Interestingly, Moreau de Saint Méry was himself a creole from the French Antilles. He was, however, educated in Paris, where he evidently developed a respect for Buffon and a knowledge of scholarly graces. See Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World*, Cambridge Massachusetts, and London, Harvard University Press, 2004, p.52

⁴⁴ Livingstone, *Putting Science in its Place*, p.104. For a more extensive discussion of scholarly etiquette, see Steven Shapin, *A Social History of Truth: Civility and Science in Seventeenth-Century England*, Chicago and London, University of Chicago Press, 1994

violated, in respect to Buffon, in respect to many respected observers, and in respect to myself, all the rules of honesty and decency'.⁴⁵ Elsewhere, in a discussion of the *anno-guazu*, Sonnini surmised that any differences between Buffon's account of the bird and that offered by Azara stemmed from the fact that the former's description was based on specimens from French Guiana, whilst the latter's focused on the Paraguayan variant of the species. 'This conclusion seems to me more natural, and above all more decent than the formal contradictions addressed by M. d'Azara to the chevalier Lefèvre-Deshayes, an estimable personage in all regards, who had supplied Buffon with some very interesting and very just remarks on the subject of the *anis*', commented Sonnini. The Frenchman reproached Azara for describing Deshayes' description as 'full of falsities and lies' – a major indiscretion in scholarly circles - and he remarked acidly that were 'such a tone of criticism' to become acceptable, then 'Natural History would soon resemble an arena of gladiators', rather than a decorous community of scholars.⁴⁶

Azara was not, of course, the only naturalist to dispense with rhetorical niceties. What is interesting about his case, however, is the way in which both Walckenaer and Saint-Méry attributed his rather abrupt put downs to his long exile on the imperial periphery, where opportunities for 'civilised' conversation were limited. Walcknaer reasoned, for example that Azara's 'distance [from Europe/civilisation] and his own obscurity exaggerated the authority of Buffon', leading him to issue a more vigorous rebuttal than was necessary.⁴⁷ Moreau-

⁴⁵ Félix de Azara, *Voyages dans l'Amérique Méridionale*, Paris, Dentu, 1809, Vol. IV, pp.142-143

⁴⁶ *Ibid.*, Vol. IV, p.28

⁴⁷ Azara, *Viajes*, Vol.I, p.13

Saint-Méry hypothesised, similarly, that ‘after a sojourn of twenty years in South America, amongst men of whom few were his social equals, the tone of a reproach could not be expected to be rigorously in unison with European urbanity’, suggesting that Azara, accustomed to issuing orders to his inferiors, had forgotten how to address polite corrections to his fellow scholars.⁴⁸ Significantly, Azara himself, perhaps aware that he had been a little hard on Buffon, invoked his working environment as an excuse, imploring those who felt that he had ‘forgotten the respect due to such an illustrious personage...to consider that my zeal for the truth is the only cause, and that I have written full of sadness and melancholy, despairing of ever freeing myself from these sad solitudes and the society of animals’.⁴⁹ Comments such as these perpetuated the image of America as a vast, untamed wilderness, an ideal venue for gathering exotic specimens, but a less than ideal arena in which to conduct scholarly debates.

Conclusion

Naturalists who operated on the imperial periphery faced a distinct set of problems. Inadequate access to up-to-date scientific text impaired their work. Imperfect or unobtainable precision instruments eroded their self-confidence, and a lack of scholarly companions – or even just technically competent accomplices – engendered a sense of solitude and intellectual loneliness. American savants worried that their measurements were imprecise or their theoretical precepts outdated. They coveted recognition from European societies and academies, yet

⁴⁸ Azara, *Essais*, p. xxiii

⁴⁹ Azara, *Viajes*, Vol. I, p.15

they feared constantly that their most cherished discoveries had already been superseded and that their work would elicit ridicule or disdain.

Of course this bleak picture needs some qualifications. On the one hand, we cannot assume that conditions were identical throughout the Spanish colonies. Some regions undoubtedly enjoyed better access to the metropolis than others, and the dearth of scientific books in Asunción did not necessarily extend to Lima or Mexico City. On the other hand, we may question the veracity of creole naturalists' most self-deprecating comments, not all of which should be taken at face value. Sometimes references to problems and impediments may be interpreted as a pre-emptive strike on the part of Americans, calculated to disarm European critics. Sometimes such pitiful tales of adversity may have been tactical manoeuvres, inserted in letters and texts to enhance the reader's surprise and admiration at their author's subsequent erudition. And sometimes expressions of self-effacement should be construed as part of a more general scholarly culture, in which 'to demur about your scientific knowledge was to show your social knowledge'.⁵⁰ Creoles therefore had a variety of motives for exaggerating the obstacles that impaired their work, and did not necessarily present an entirely faithful picture of their actual working conditions.

These qualifications noted, however, there was certainly a kernel of truth in the concerns articulated by creole naturalists. Whilst their situation was not always as dire as they portrayed it, most American savants were *relatively* impoverished in their access to books, instruments and forums for scientific discussion compared to their counterparts in Madrid, London or Paris, and, perhaps more important, the majority *believed* themselves to be at a disadvantage

⁵⁰ Susan Scott Parrish, *American Curiosity: Cultures of Natural History in the Colonial British Atlantic World*, Williamsburg, North Carolina University Press, 2006, p.117

in these areas. This conviction – valid or not – influenced their self-perception and self-presentation. It induced a sense of inferiority and dependence on the part of some Americans, and led them to characterise their encounters with European scholars as moments of epiphany.

Chapter 5: The Creole Conundrum

So far we have outlined the problems that creole naturalists faced. We have emphasised the disadvantages under which they operated and the insecurities that these engendered, suggesting a need for European acceptance and vindication. Creole naturalists, however, were not entirely submissive. They did not always defer unquestioningly to the authority of their European counterparts, but, on the contrary, rallied to defend their homeland – usually conceived in regional rather than continental terms – from the slurs of European philosophers such as Buffon and de Pauw. They disputed allegations that New World nature was smaller, weaker and less perfect than that of the Old World. They also resented attempts to incorporate American plants and animals into classificatory systems concocted in Europe, celebrating instead the uniqueness of local nature.

In *Putting Science in its Place: Geographies of Scientific Knowledge*, David Livingstone argues persuasively that ‘science is not some eternal essence slowly taking from history’, but rather ‘a social practice grounded in concrete historical and geographical circumstances’.¹ This chapter considers what differentiated colonial/peripheral from imperial/metropolitan science in the eighteenth-century Hispanic world. It combines Livingstone’s approach to the history of science with the growing historiography on creole patriotism, which posits the gradual emergence of a distinctive creole identity in Spanish America. David Brading contends in *The First America*, that ‘no matter how much Spanish America depended on Europe for its art forms, literature and general culture, its chroniclers and patriots succeeded in creating an intellectual tradition that, by reason of its engagement with the historical

¹ David N. Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge*, Chicago, University of Chicago Press, 2003, p.180

experience and contemporary reality of America, was original, idiosyncratic, complex and quite distinct from the European model'.² John Elliott concurs with this view, concluding that 'between 1670 and the 1760s the viceroyalties of New Spain and Peru succeeded in creating a distinctive Hispano-American culture that transcended replication, and represented a genuine transmutation of the forms and images borrowed from Spain'.³ The chapter suggests that natural history was one of the fields in which this transmutation occurred. It explores how European misconceptions about American nature galvanised savants on the imperial periphery to dispel errors about their homelands, and how their research in turn fortified their patriotic sentiments.

The Experience of a Lifetime

Creole objections to European science arose most forcefully in response to provocative slights on their homeland. These insults surfaced initially in the work of the French naturalist, the Comte de Buffon, who concluded in his celebrated *Histoire Naturelle* (1761) that America was colder and wetter than the Old World, and its fauna, correspondingly, smaller and weaker. They were perpetuated by the Prussian philosophe Cornelius de Pauw, who appropriated and sensationalised this theory of New World degeneration.

In his incendiary *Récherches Philosophiques sur les Américains* (1770), de Pauw disparaged American nature as by turns pitiful and monstrous. The Prussian dismissed the 'lions' and 'tigers' of the New World as 'bastardised, small,

² Brading, *The First America*, p.5

³ John H. Elliott, *Empires of the Atlantic World: Britain and Spain in America 1492-1830*, New Haven and London, Yale University Press, 2006, p.247

pusillanimous and a thousand times less dangerous than those of Asia and of Africa'.⁴ He sneered that American mammals were 'a sixth smaller than their counterparts in the old continent',⁵ and he objected to the 'abnormal' forms of the tapir, the anteater and the sloth, which had different numbers of toes on their fore and hind legs.⁶ De Pauw alleged that European creatures transplanted to America deteriorated in its unhealthy climate, with the single exception of the pig, 'which has there acquired a surprising corpulence'.⁷ He also hypothesised that the cold, dank conditions made the New World a paradise for noxious insects and unsavoury reptiles, which flourished in this squalid environment. 'In glancing at the excellent figures drawn in Surinam by Mademoiselle Merian, one is struck by the prodigious size of the butterflies, which equal the volume of our birds', snorted de Pauw.⁸ 'Panama is afflicted by serpents, Cartagena by the swarms of enormous bats [and] Portobello by toads'.⁹

Creoles reacted angrily to inferences that America's climate was insalubrious, issuing spirited rebuttals.¹⁰ The exiled Jesuit Juan de Velasco denied that America was awash with venomous insects and reptiles and he assured readers of his *Historia del Reino de Quito* (1789) that 'there is no country comparable to Quito in cleanliness, and lacking almost totally in all that signifies danger, discomfort or

⁴ Cornelius De Pauw, *Récherches Philosophiques sur les Américains, ou Mémoires Intéressants pour Servir à l'Histoire de l'Espèce Humaine*, London, 1770, p.8

⁵ Ibid., p.4

⁶ Ibid., p.12

⁷ Ibid., p.13

⁸ Ibid., p.7

⁹ Ibid., p.8

¹⁰ For an extended discussion of the ongoing debate concerning the supposed inferiority of new-world nature, see Antonello Gerbi's classic work, *The Dispute of the New World*, Pittsburgh and London, University of Pittsburgh Press, 1973

annoyance to human life'.¹¹ The Peruvian physician Hipólito Unanue found this allegation equally ludicrous, retorting tartly that 'in Paris alone there are seventy seven species of bedbugs',¹² whilst the Spaniard Azara challenged Buffon's assertion that old-world mammals dwarfed their American counterparts. 'If my monkeys do not equal [in size] those of Africa', stated Azara, 'nor my curés the warthog, then my ferrets exceed the African variety... my otter surpasses that of Europe, my vizcacha the marmot, my armadillos the pangolin and the bull of Montevideo that of Salamanca'. If America lacked any feline capable of rivalling the tiger or the lion, then 'conversely there is not beast in Europe with the mouth and teeth of a rat [i.e. a rodent] that can compete in size with the capybara'. And if America currently offered no animal of comparable size to the elephant or the hippopotamus, then this had not always been the case for 'there have been found in the interior countryside of the Rio de la Plata the bones of quadrupeds that can compete with these Asiatic colossuses'.¹³ The calumnies of European philosophes were thus both outrageous and unfounded. They were, as the Mexican Fray Servando Teresa de Mier diplomatically phrased it, 'ravings worthy of the padded cell'.¹⁴

Whilst some creole responses remained at the level of affronted denials, others blossomed into a more sophisticated critique of scientific assumptions and methodologies. They questioned not merely the conclusions to which Buffon and others had come, but also, more radically, the manner in which those conclusions had been reached. Jorge Cañizares-Esguerra contends that the creoles 'launched a

¹¹ Juan de Velasco, *Historia del Reino de Quito en la América Meridional*, Quito, Imprenta del Gobierno, 1841, Vol. I, p.109

¹² José Hipólito Unanue, 'Historia del Clima de Lima', in *Obras Científicas y Literarias*, Barcelona, Tipografía la Académica, 1914, p.64

¹³ Azara, *Quadrúpedos*, Vol.I, p.vii-x

¹⁴ Gerbi, *The Dispute of the New World*, p.314

formidable attack upon the reliability of travellers' testimony' and favoured, by contrast, their own sustained contact with new-world nature.¹⁵ Antonio Lafuente also diagnoses a more profound basis to creole polemics. Assessing the tensions between metropolitan and peripheral science in late imperial New Granada and New Spain, Lafuente identifies a multifaceted tussle for credibility that pitted 'public against private, the theoretical against the pragmatic, the paradigmatic against the local, academic interest against patriotic interest and study in the cabinet against study in the field'.¹⁶ These contests signified a clash between the universal and the local in which the creoles summoned personal experience, indigenous traditions and regional curiosities to mount an assault upon European knowledge systems.

David Livingstone has argued that different spaces and places spawn different credibility strategies that determine the validity of the scientific knowledge that is produced in them. One especially piquant rivalry at the turn of the nineteenth century centred upon the antagonistic truth claims of the travelling naturalist, who roamed distant lands in search of exotic specimens, and his sedentary counterpart, who operated within the confines of a metropolitan museum. Dorinda Outram has shown how these distinct breeds of naturalist marshalled place-specific arguments to enhance their scientific status. The intrepid travelling naturalist witnessed nature in the flesh, active, tantalising, alive, and founded his scientific authority on his proximity to objects he was observing, and his personal knowledge of their native environment. The museum-based naturalist, by contrast, only saw nature at one remove from its

¹⁵ Jorge Cañizares-Esguerra, 'La Ilustración hispanoamericana: una caracterización', in Jaime E. Rodríguez (ed.), *Revolución, Independencia y las Nuevas Naciones de América*, Madrid, MAPFRE, 2005, p.92

¹⁶ Antonio Lafuente, José de la Sota and Jaime Vilchis, 'Dinámica Imperial de la Ciencia: Los Contextos Metropolitano y Colonial en la Cultura Española del Siglo XVIII', in Agustín Guimerá (ed.), *El Reformismo Borbónico*, Madrid, CSIC, 1996, p.202

natural state, static, faded and lifeless in a collection. Unable to claim intimacy with the behaviour of an animal or the habitat of a plant, he stressed instead his ability to inspect at close quarters beasts that were too dangerous to approach when alive, to compare species from around the globe and to survey at his leisure a broad spectrum of the natural world.¹⁷

The Spaniard Félix de Azara exemplified the stance of the travelling naturalist. Having scrutinised Paraguay's birds and mammals *in situ*, for more than twenty years, Azara unsurprisingly expatiated on the benefits of direct observation. He emphasised that he had written his descriptions of American species 'in their presence', and proclaimed himself less susceptible to error than 'those who have seen [them] weakened, bald and dirty in cages and chains' or 'those who have searched for them in Cabinets, where, in spite of the greatest care, the ravages of time must have greatly altered their colours, turning black into chestnut etc; and where no skin or skeleton, not even the best prepared, gives a precise idea of their forms and measurements'.¹⁸

Another Spaniard, José Clavijo-Fajardo, made the case for the sedentary naturalist. As deputy director of Madrid's Real Gabinete de Historia Natural, Clavijo

¹⁷ Dorinda Outram, 'New Spaces in Natural History', in Jardine, Secord and Spary, *Cultures of Natural History*, pp.249-265. Outram offers the example of the French comparative anatomist, Georges Cuvier, who, reviewing a fieldwork report by the travelling savant Alexander von Humboldt in 1807, conceded that his defunct specimens lacked the enchantment and immediacy of the living things viewed by the Prussian, yet argued that this inconvenience was more than compensated by the ability to survey, dissect and compare natural objects from across the globe, free from the perils and distractions that assailed the scientific explorer. 'If the sedentary naturalist does not see nature in action, he can survey all her products spread before him', mused Cuvier. 'He can compare them with each other as often as is necessary to reach reliable conclusions', and 'he can bring together the relevant facts from anywhere he needs to'.

¹⁸ Azara, *Quadrúpedos*, Vol. I, p.ii. Azara suspected, for instance, that Buffon had underestimated the dimensions of the jaguar, because he only measured the skins of dead animals (Vol.I, p.103). He pointed out that 'Buffon has not seen [the tapir], and finds himself obliged to copy the reports of other authors, with the descriptions of Marcgrave and Barrère' (Vol.I, p.8), and, describing a species of vampire bat – known appropriately as 'el mordedor', or 'the biter' – he dismissed La Condamine's assertion that the bite of this animal was fatal to cattle, and Juan and Ulloa's claim that it 'occasions an extreme weakness' in men. 'These individuals, in my judgement, have never had this bat in their hand', meditated Azara, who professed to have penned his own description 'in their presence' (Vol. II, p.297).

did not have the opportunity to view his subjects in their natural habitats, or to study their behaviour whilst alive, disadvantages he acknowledged. The Spaniard insisted, nevertheless, that there were some things that a travelling naturalist could not do, and he savoured the advantages offered by a museum, which 'presents the treasures of nature to us with method and order'. 'In [a cabinet of natural history] we can observe and touch the most ferocious animals, we can approach them without fear or difficulty and take the dimensions of their skeletons' meditated Clavijo. 'There ceases the natural restlessness and volubility of the birds, and their rest permits us to examine tranquilly their most delicate features'.¹⁹ The travelling naturalist, presented with vibrant, disordered nature, did not have the time or the facilities to engage in such studious contemplation, and he forfeited overview for immediacy.

Where did creole naturalists fit within this framework? In many ways, their position approximated more closely to that of the travelling savant than to his sedentary counterpart. From their vantage point on the imperial periphery, American men of science rebuked immobile theorists such as Buffon and de Pauw for judging American phenomena from a distance, and they based their own scientific credibility upon their prolonged experience of local nature. Whilst creole naturalists challenged the conclusions of sedentary savants, however, they did not entirely subscribe to the rationale of the scientific explorer. On the contrary, several creoles also attacked the authority of travelling naturalists, whose fleeting visit to their territories exposed them to error and precluded the kind of intensive study that was necessary to properly understand American nature.²⁰

¹⁹ Clavijo y Fajardo, *Historia Natural*, pp.xv – xvi.

²⁰ Jorge Cañizares-Esguerra has observed how 'foreign travellers, including the Peninsulars, were described as the defenceless victims of time [or the lack of it] and Amerindian deception', owing to their ignorance of native languages. See Jorge Cañizares-Esguerra, 'La Ilustración hispanoamericana', p.92

The North American Thomas Jefferson proffered precisely these arguments in *Notes on the State of Virginia* (1800). Disputing Buffon's erroneous conclusions about American fauna, Jefferson blamed the Frenchman's reliance upon the reports of travellers, whose training in natural history was often minimal, and he questioned whether such individuals were in a position to judge what they saw. 'But who were these travellers?' fumed Jefferson. 'Was natural history the object of their travels? Did they measure or weight the animals that they speak of, or did they judge of them by sight or perhaps even from report only?' Jefferson suspected the latter, and he also queried whether such travellers were 'acquainted with the animals of their own country, with which they undertake to compare them'. 'A true answer to these questions would probably lighten their authority, so as to render it insufficient for the foundation of an hypothesis', speculated the American, for only an informed and extended analysis of American nature could provide sufficient data for reliable conclusions.²¹

The Ecuadorian Juan de Velasco mustered similar arguments in his 1789 *Historia del Reino de Quito*. Opening the natural history section of the work, Velasco chastised those European philosophers who 'without moving themselves from the Old World, have traced such a sad anatomy of the New'.²² The Ecuadorian pledged 'to refute the calumnies, falsities and errors of some modern writers, especially foreigners', and he extended his critique to travelling naturalists, who witnessed only a small part of America but then extrapolated from their observations to include the entire continent. The French academician Charles Marie de la Condamine, for example, had claimed that all American birds were mute, and that 'one scarcely finds

²¹ Thomas Jefferson, *Notes on the State of Virginia*, Baltimore, 1800, p.56

²² Velasco, *Historia del Reino de Quito*, Vol. I p.iii

one with a harmonious song'. Velasco retorted that La Condamine was speaking 'only of those that he saw and observed in the province of Maynas' when he made this generalisation; if the Frenchman had explored the colder regions of the kingdom, then he would have found numerous birds with indisputably angelic voices.²³

Velasco juxtaposed the ignorance of armchair philosophers with his own intimate knowledge of Quito's natural treasures. His text is peppered with expressions such as 'I have seen' and 'I was eyewitness to', and he savoured both his proximity to American wildlife and his sustained and repeated observation of natural phenomena. Prefacing his discussion of South American mammals, for instance, Velasco promised to talk about Quito's ninety different species of quadruped 'according to what I have seen myself, with the experience of so many years'.²⁴ The Jesuit announced that he had seen a manatee 'with my own eyes',²⁵ that he had seen a species of bear called the *Ucumari* 'frequently'²⁶ and that he 'saw [pacos and llamas] daily for many years'.²⁷ He also described how he had examined the cadaver of a man-eating puma in 1741, insisting that Buffon's claims about the cowardice of this animal were wrong, something he would have known if he had ever witnessed one in action. 'Those who have not seen it deny that there is a true lion in America', scoffed Velasco. 'But what does it matter if they are laughed at by all those who have either better information or personal experience?'²⁸

²³ *Ibid.*, p.106

²⁴ *Ibid.*, p.82

²⁵ *Ibid.*, p.97

²⁶ *Ibid.*, p.85

²⁷ *Ibid.*, p.82

²⁸ *Ibid.*, p.84

The New Granadan Caldas also espoused the virtues of direct observation. He shared Velasco's aversion to study-bound savants like De Pauw, and he promised to base his own scientific claims strictly on personal experience. Opening a treatise on the influence of climate on living things, Caldas announced that he would always be 'guided by the torch of observation', even if his results contradicted the findings of established thinkers. 'My knees will bend before no philosopher' declared the creole, for the views of Newton, Buffon or Montesquieu, 'count for little if *reason* and *experience* do not confirm them'.²⁹ Later in the same text, Caldas dismissed the conjectures of De Pauw, asserting that 'we will not subscribe to the deliriums of the philosopher of Prussia'. He also reiterated the need for prolonged and careful observation.³⁰ 'We must not judge nature from first impressions' admonished Caldas. 'We must distrust appearances [and] we must not slander [it] before we have penetrated further into its august sanctuary; we must approach, observe [and] measure before reaching a decision on such important material'.³¹

Like Velasco, Caldas extended his critique to the travelling naturalist. Explaining, for example, why the Spanish botanists Ruíz and Pavón had misclassified a genus called the *Jaraba* in the *Flora del Perú*, disagreeing with the conclusions of José Celestino Mutis and his students, Caldas attributed this 'monstrous difference' to the fact that the latter 'have observed it alive, and the authors of the *Flora* have based their illustration and their description on skeletons'.³² Upon hearing of Humboldt's forthcoming expedition to South America, meanwhile, the New Granadan voiced

²⁹ Francisco José de Caldas, 'Del Influjo del Clima sobre los Seres Organizados', in *Obras Completas*, p.80

³⁰ *Ibid.*, p.95

³¹ *Ibid.*, p.102

³² Francisco José de Caldas, 'Prefación a la Geografía de las Plantas', in *Obras Completas de Francisco José de Caldas*, Bogotá, Imprenta Nacional, 1966, p.390

some doubts as to the prospective achievements of his research, concerned that such a fleeting visit would only perpetuate existing misconceptions. ‘Can we expect anything useful and wise from a man who is going to traverse the Kingdom [of New Granada] with the greatest speed?’ questioned Caldas. ‘Is it to be believed that he will make good astronomical, physical, mineralogical and botanical observations in three or four months?’ And was there not a danger that Humboldt would ‘fill Europe with preoccupations and false reports, as almost all travellers have done?’³³

In the event, Humboldt’s expertise and thoroughness assuaged some of Caldas’ apprehensions, convincing the creole of his erudition. Caldas reasoned, nevertheless, that the Baron’s enormous workload and pressing itinerary must have resulted in some errors, and he proposed, where possible, to rectify these blunders, in the interest of truth and accuracy. Introducing his Spanish translation of the Prussian’s *Géographie des Plantes*, for example, Caldas hypothesised that

Baron Humboldt, surrounded by an abundant vegetation, and by all the animals that populate our forests, devoting attention to our fossils, and the form and direction of our mountains, to the rivers, to the valleys, to the weather, to the temperature, to the geography, to astronomy – in a word, to whatever was presented to him by the sky or by the land – passing through with the speed that his long journey demanded, must necessarily have divided his penetration between many objects and made some errors.

Having ‘followed closely the steps of this illustrious traveller, with the same objectives and with the *Géographie des Plantes*, in hand’, the New Granadan considered himself in a position to amend Humboldt’s work, though he went out of his way, to emphasise that his corrections stemmed not from malice or envy, but from

³³ Letter from Francisco José de Caldas to Santiago Pérez Arroyo, 20 July 1801, Jean Chenu, *Caldas*, p.107

a devotion to the truth. 'It is not an urge to write, nor the foolish vanity of exaggerating the errors of great men that obliges us to make some notes [on the *Géographie des Plantes*]', protested Caldas, but 'love for the truth', and 'a desire to illustrate some points on the physics and natural history of our countries'. Thus, 'whilst we respect the enlightenment, the vast knowledge and the great talents of this extraordinary traveller, we respect the truth more'.³⁴

The creoles' enthusiasm for direct observation was not, of course, an entirely novel phenomenon. It resembled – and sometimes consciously reprised – the approach of sixteenth-century Spanish scholars and conquistadors, whose sudden acquaintance with the uncharted fauna and flora of the New World compelled them to jettison long held beliefs, to re-examine established models and to question the teachings of the ancients. These earlier scholars also championed experience and empirical research, and, in the process, eroded the authority of classical authors. Indeed, Antonio Barrera interprets their epistemological stance as the catalyst for the Scientific Revolution, which, in his view, commenced in Spain after the discovery of America. 'Experience, of course, had always played a role in validating knowledge', concedes Barrera, 'but the knowledge gained in exploration and in contact with other cultures in the New World made experience a much more important player than the authority of classical sources'.³⁵

³⁴ Francisco José de Caldas, 'Prefación a la Geografía de las Plantas', in *Obras Completas*, pp.384-385. One creole who was slightly more tolerant of travelling naturalists was the Chilean Jesuit Ignacio Molina. Unlike most of his fellow Americans, Molina confined his criticisms to sedentary savants such as de Pauw. He praised Louis Feuillé's account of Chilean plants, which 'described with extraordinary precision the principal vegetables that are raised here' and he also summoned the testimony of European writers to corroborate his descriptions of 'such a remote country'. This more lenient treatment of travellers likely reflected the fact that Chile had fared relatively well in the writings of European visitors, which painted this province more favourably than other regions of America. See Juan Ignacio Molina, *Compendio de la Historia Geográfica, Natural y Civil del Reyno de Chile*, Madrid, Sancha, 1788, pp.vi and xiii.

³⁵ Barrera-Osorio, *Experiencing Nature*, p.15

Emblematic of this sixteenth-century stance was the Spanish Jesuit José de Acosta, whose *Historia Natural y Moral de las Indias* appeared in 1590. Introducing the natural history section of the work, Acosta stipulated that he would confine his observations to 'some natural things that I saw and contemplated while in the Indies, or that I heard from very reliable persons and which I believe are not commonly known in Europe'.³⁶ Acosta conscientiously corrected prevailing errors and misconceptions, noting, for instance, that 'the lions that I saw [in the Indies] are not reddish in colour, nor do they have those manes with which they are usually pictured'.³⁷ He also explicitly conceived of his work as an advance upon those of the ancients, who, for all their erudition, had never witnessed American nature in the flesh. 'We must consider the providence and riches of the Creator, who distributed such a variety of trees and fruit to such varied parts of the world, all for the service of men who inhabit the earth', intoned Acosta; 'and it is a wonderful thing to see so many differences in shape and tastes and properties never known and heard of in the world before the discovery of the Indies, and of which Pliny and Discorides and Theophrastus and other scholars achieved no knowledge despite their diligence and curiosity'.³⁸

Eighteenth-century creole naturalists agreed with Acosta that 'if we are to judge the species of animals by their characteristics, those of the Indies are so diverse that to try to reduce them to species known in Europe would be like calling an egg a chestnut'.³⁹ Their protests differed in tone from those of the Jesuit, however, for

³⁶ José de Acosta, *Historia Natural y Moral de las Indias, en que se tratan las cosas notables del cielo, elementos, metales, plantas y animales de ellas; y los ritos, ceremonias, leyes, gobierno y guerras de los Indios*, Madrid, Pantaleón Aznar (ed.), 1792, Vol. I, p.107

³⁷ *Ibid.*, p.269

³⁸ *Ibid.*, p.249

³⁹ *Ibid.*, pp.273-274

whilst Acosta always addressed classical writers with the utmost respect and exonerated them of wilful misunderstanding, eighteenth-century creoles interpreted the slurs of Buffon and especially de Pauw as malicious attacks upon their native fauna and flora, repudiating theories that systematically denigrated American nature. Indicative of this more hostile stance is the Ecuadorian Velasco, who, commenting on Buffon's reputation as 'the Pliny of France', retorted that the Frenchman deserved this title but, 'more justly for his falsities against America than for his great work'. 'I do not find any other difference between the two Plinys', sneered Velasco, 'except that the old one refers many fables through lack of criticism and an excess of good faith, whilst the new one refers them in accordance with his system'.⁴⁰ By this reckoning, Pliny was thus guilty of an innocent mistake; Buffon of calculated defamation.

What's in a name?

Creole naturalists sought intellectual validation in their local knowledge and experience. They also authenticated their claims with reference to another resource – the accumulated expertise of indigenous people. Like the eighteenth-century Spaniards who scoured the past for suitable scientific precursors, American savants attempted to fabricate a distinct scholarly tradition to rival that of Northern Europe. Where the Iberians had acclaimed the achievements of sixteenth-century naturalists, such as Francisco Hernández, their creole cousins summoned the scientific heritage of Amerindian civilisations, primarily the Incas and the Aztecs.

Illustrative of this position was the Peruvian physician, Hipólito Unanue. In an article on the benefits of botany, Unanue assessed the progress of this science in his homeland and declared that '[Peru's] primitive inhabitants, dedicated to Agriculture

⁴⁰ Velasco, *Historia*, p.79

and Empirical Medicine, came to discover the virtues of a great many plants'. 'The doctrine propagated orally from fathers to sons', proclaimed the physician, 'a certain peculiar inclination for this form of study, and the high employment it earned them, made them excellent herbalists'. Indeed, so adept were the Indians in this field that they deserved to be considered 'the fathers and founders of Botany in Peru'.⁴¹

Other enlightened Peruvians concurred with this verdict. Pedro Nolasco Crespo, in a dissertation on the coca plant, credited the ancient Peruvians with the careful cultivation of this species, 'so that it is today a bush perfected by the industry of the Incas'.⁴² Joseph Manuel Bermúdez, a priest from Huánuco, lavished similar praise upon the Incas and pondered the extent of their botanical discoveries. 'How much did they advance in the discovery of simples, in the virtues of plants and in the use of herbs in their Botany and Medicine?' speculated Bermúdez.⁴³

The Incas were not the only Amerindian civilisation to attract such exuberant eulogies. Aztec expertise also elicited praise, not least from the pen of the exiled Mexican Jesuit Francisco Clavijero. In his *Storia Antica del Messico*, Clavijero commended the botanical gardens constructed by the Aztec nobility, in which 'were planted with good order fruit trees, medicinal herbs and flowers'. The Jesuit claimed that 'amongst the gardens of the vast palace of the Lord of Itzapalapan, there was one whose magnitude, disposition and beauty overwhelmed the Spanish conquistadors in admiration', and he asserted that Montezuma's brother and successor, Cuitlahuatzin, had founded a garden of similar magnificence. 'He had transplanted there many plants

⁴¹ José Hipólito Unanue, 'Descripción Científica de las Plantas del Perú', p.96

⁴² José Hipólito Unanue, 'Disertación sobre el cultivo y las virtudes de la famosa planta del Perú nombrada 'coca'', in *Obras Científicas y Literarias*, Barcelona, Tipografía la Académica, 1914, Vol.II, p.102

⁴³ José Manuel Bermúdez, 'Discurso sobre la Utlidad e Importancia de la Lengua General del Perú', in Jean-Pierre Clément (ed.), *El Mercurio Peruano, 1790-1795*, Vol. II, Frankfurt, Vervuert, 1998, p.258

from distant places', enthused Clavijero, 'as is attested by Dr Hernández, who saw it'.⁴⁴ Clavijero devoted several paragraphs to the principal plants cultivated by the Aztecs, such as the maguey plant, from whose leaves 'they made paper, thread, needles, clothes, footwear and rope', and he concluded his eulogy with praise for Montezuma's menagerie. 'In the Royal Houses [one could find] almost all of the species of quadrupeds and birds of these countries, and many aquatic animals and reptiles', rhapsodised the Jesuit. Indeed, 'it may be said that in this genre of magnificence, Montezuma II surpassed all the kings of the world, and that there has never been a nation that can equal the Mexicans in the care of so many species of animals, nor in the knowledge of their inclinations, diet, habits and means of propagation'.⁴⁵

Creole naturalists founded their scientific credibility partly on their ability to access this rich store of Amerindian expertise. This ability stemmed not merely from their proximity to the Indians, but also from their familiarity with native languages, which permitted them to penetrate the secrets of indigenous people and to avoid the errors committed by non-Quechua or Nahuatl-speaking foreigners. As Cañizares-Esguerra has observed, Creole savants frequently accused Europeans of distorting American nature because they misinterpreted native taxonomies and succumbed to Indian duplicity. They prescribed the study of Amerindian tongues as essential to the acquisition of natural knowledge.

One key advocate of linguistic proficiency was the Mexican Clavijero. Reviewing the work of Buffon, Clavijero suspected that the Frenchman had underestimated the

⁴⁴ Francisco Saverio Clavijero, *Storia Antica del Messico cavata dai migliori storici spagnuoli, e da manuscritti e dalle pitture antiche degl'Indiani: divisa in dieci libri, e corredata di carte geografiche e di varie figure e dissertazioni sulla Terra, sugli Animalì e sugli abotatori del Messico*, Vol. II, Gregorio Biasini all'Insegna di pallade, Cesena, 1780, p.156-157

⁴⁵ *Ibid.*, pp.158-159

number of quadrupeds in America because he did not understand Indian animal names. The naturalist consequently amalgamated species that should have been classified separately. 'Had Buffon known Nahuatl and, more important, had he spent time in Mexico, he would have realised that the species he placed into a single category were in fact separate and distinct', conjectured Clavijero.⁴⁶

The Chilean Molina concurred with this view, ascribing negative perceptions of America's mammals to errors in nomenclature. 'Nothing has been so pernicious to the natural history of America as the abuse that has been made, and that continues to be made, of nomenclature', fumed Molina, for it was the tendency to bestow old-world names upon new-world creatures on the basis of some spurious analogy that led the latter to be seen as 'inferior' versions of beasts to which they were not even remotely related. 'A very respectable modern author who believes the degeneration of the animals of America to be evident, cites as proof of his opinion the American *Myrmecophaga* [anteater], known vulgarly as the 'ant-bear', dismissing it as a degenerate branch of the bear family', snorted Molina. 'But since all naturalists are agreed that this small quadruped differs from the bear not only in the genus, but also in the order, there is no reason to view it as a bastard variety of a species with which it has never had the slightest affinity'.⁴⁷

⁴⁶ Jorge Cañizares-Esguerra, 'Postcolonialism avant la lettre? Travellers and Clerics in Eighteenth-Century Colonial Spanish America', in Mark Thurner and Andrés Guerrero (eds.), *After Spanish Rule: Post Colonial Predicaments in the Americas*, Durham and London, Duke University Press, 2003, p.93

⁴⁷ Molina, *Compendio*, p.304. For additional examples of the misnaming of American creatures see John Miller, *The Memoirs of General Miller*, AMS Press New York 1973, Vol. I, p.149 and Charles Marie de la Condamine, *Rélation Abrégée d'un Voyage dans l'intérieur de l'Amérique Méridionale, depuis la côte de la Mer du Sud jusqu'aux côtes du Brésil et de la Guiane, en descendant la rivière des Amazones*, Paris, 1745, p.469. The patriot General William Miller, stationed in America during the wars of independence, remarked that the 'tigers' in the New World were 'not equal in size or ferocity to the Bengal tiger', whilst the 'lions' were 'unlike those of Africa in form, size, and disposition', describing what were probably jaguars and pumas in just the negative style that Molina denounced. The French explorer Charles Marie de La Condamine referred, similarly, to the difficulties inherent in translating animal names, and offered an insight into how misunderstandings could occur. Describing a 'species of weasel' from the Amazonian region of Peru, La Condamine confessed that 'I was unable either to pronounce or to write the name that I was told it bore in that [the local Amerindian] language'.

Another writer to champion linguistic accuracy was Azara. The Spaniard seems to have mastered at least a smattering of Guaraní during his time in Paraguay, and he, like Clavijero, ascribed many of Buffon's blunders to his reliance upon non-Guaraní-speaking travellers. Describing a species of cat called the Mbaracayá, for instance, Azara charted the various names that travellers had assigned this beast and curtly dismissed them all:

Buffon describes it as Maragüa or Maragayá, which he supposes to be the name they give it in Brazil, following Abbeville in this. Marcgrave calls it Maracayá, and Barrère Malakayá. But all of these names are altered, and it should be as I write it.⁴⁸

Touring the Musée d'Histoire Naturelle in 1803, Azara was equally critical. The Spaniard detected many creatures that he considered inappropriately labelled, and he insinuated that the names of these animals had mutated as much as their colours and forms. 'The names have suffered no fewer alterations', asserted Azara, 'to the extent that they would be unintelligible in the country inhabited by those same animals'.⁴⁹

A familiarity with indigenous languages was thus essential for the accurate identification of new-world plants and animals. It was also, on occasion, helpful in determining the appearance and uses of American productions, since Amerindian names often conveyed information about their uses and properties that Linnaean taxonomy obscured.⁵⁰ Where Linnaeus' binomial system divorced American species

The Frenchman was compelled, as a result, to transcribe instead the Brazilian name for what he believed to be the same creature 'coati', potentially conflating two different species.

⁴⁸ Azara, *Qadrúpedos*, Vol. I, p.151

⁴⁹ Azara, *Viajes*, Vol. I, p.100

⁵⁰ Londa Schiebinger interprets the imposition of Linnaean names on non-European plants as 'a form of what some botanists have called 'linguistic imperialism', a politics of naming that accompanied and promoted European global expansion and colonisation'. See Schiebinger, *Plants and Empire*, pp.194-225

from their natural environment, focusing purely on those features that related to their classification, Amerindian naming practices tended to reflect the virtues, location or physical appearance of a plant, or the form and behaviour of an animal, a characteristic that some scholars regarded as useful. Azara, referring to a species of anteater known as the Caguire, remarked that this guaraní title ‘signifies stinking one of the forest, and suits the beast’, which emitted a foul smell when disturbed.⁵¹ The Spanish botanist Vicente Cervantes likewise recognised the expressive nature of Nahuatl plant names when he reviewed the work of the sixteenth-century naturalist Francisco Hernández, compiled in conjunction with Aztec experts. ‘At every instant one finds in it the names of plants that indicate the disease to which they may be applied’, commented Cervantes. Hence *cihaupatli* signified ‘medicine for women’, whilst *palancapatli* meant ‘medicine for wounds’.⁵²

A more militant advocate of Amerindian naming practices was the Mexican patriot José Antonio Alzate. In a letter printed in the *Gazeta de México* (24 June, 1788), Alzate criticised Linnaean taxonomy – newly introduced to Mexico by the Sessé expedition – as ‘fatuous’ and unhelpful, because its Latin binomials obscured the virtues of plants and taxed the human memory. Alzate protested that ‘to want to substitute languages is an extravagance’.⁵³ He challenged ‘the most enthusiastic Linnaean’ to name him ‘any sick person who was restored to health because Linnaeus

⁵¹ Azara, *Quadrúpedos*, Vol. I, p.73

⁵² Vicente Cervantes, ‘De la violeta estrenada de sus virtudes. Extracto del discurso leído en México el día 3 de Junio de 1798’, *Anales de Historia Natural*, nº 20, vol.7, Madrid, Imprenta Real, 1804, pp.187-188

⁵³ ‘Carta que en defensa de la Botánica y de las imposturas que el Autor de la Gazeta Literaria opone contra el Systema de Linneo, escribe al Director del Jardín Botánico uno de sus alistados Discípulos’, *Gazetas de México, Compendio de Noticias de Nueva España que comprehenden los años de 1788 y 1789*, Vol.III, Mexico City, Felipe de Zuñiga y Ontiveros, Suplemento a la Gazeta de Mexico del Martes 6 de Mayo de 1788, p.98

discovered through his method a new virtue of a plant', or 'any dyer who owed to his perceptiveness a new or cheaper ingredient', and he commended instead Nahuatl plant names, which encapsulated the properties of Mexican species.⁵⁴ 'If a new Botanical Language were to be formed in this way it would be of great utility to the Public', concluded Alzate, 'but to borrow Greek words forged amidst the ices of Denmark is a mistake'.⁵⁵

Caldas concurred with this view. In the preface to his translation of Humboldt's *Géographie des Plantes*, the New Granadan extolled the virtues of Quechua naming conventions, which like their Nahuatl equivalents, referenced the appearance, location or uses of native plants. Caldas reflected the 'the Peruvians, always precise and always careful in giving things names derived from their properties, their virtues, their figure, their position etc., named the herbs according to their virtues and uses in medicine, in the arts and in society'. He cited as an example a plant that the Indians called 'calpuchina yuyu', which translated literally as 'herb that makes walk', and which, when consumed, could indeed rehabilitate a cripple.⁵⁶

Like Alzate, Caldas compared Quechua naming practices favourably with Linnaeus' Latin binomials, which, instead of communicating the characteristics of a plant, commemorated the achievements of famous (and not so famous) men. Mauricio Nieto has observed, for example, how the '116 genus dedicated to concrete individuals in [Gómez Ortega's] *Prodomus* constituted a complete guide both to the

⁵⁴ Alzate remarked that 'the Ancient Mexicans 'in respect to Geography, used etymological words that referenced their situation or territorial circumstances' and he claimed that 'they expressed themselves in the same manner in respect to their Pharmacy', using terms such as 'Tzoapatli, herb for giving birth' and 'Achiotl, good material for dyeing', with the result that 'through the denomination came knowledge'. See *Ibid.*, p.99

⁵⁵ *Ibid.*, p.99

⁵⁶ Francisco José de Caldas, 'Prefación a la Geografía de las Plantas', in *Obras*, p.389. See also Jean-Pierre Clement, 'De los Nombres de Plantas', *Revista de Indias*, Vol. XLVII, Number 180, 1987, p.389

history of botany and to the political history of Spain', including such names as *Ruizia* and *Pavonia*, after the Spanish botanists, *Floridablanca*, after the minister of that name, and *Gomortega*, after the author himself.⁵⁷ Caldas took issue with this approach because it suppressed potentially useful information about a plant's properties. He questioned 'what idea the words *discorea*, *plinia*, *buffonica*, *boerhavia*, *sigesvechia* can give us of a plant?' and concluded that 'they tell us nothing, other than that there has been a Dioscorides, a Pliny, a Buffon, a Linneus, a Boerhaave, to whose memory these plants have been consecrated'. The American reserved even greater censure for 'those dedications to ignorant and obscure men that have proliferated in our age', immortalising dilettantes and noneties, and he argued that 'botany needs a reforming genius, an extraordinary man, who, with the weight of his knowledge and authority, banishes from this science the names of so many botanophiles and of so many others who do not even merit that name'. He intimated that this genius, when he materialised, could do worse than follow the wise example of the Incas.⁵⁸

Putting Nature in its Place

Natural history illustrations provoked a similar debate. Like Linnaean taxonomy, late eighteenth-century natural history illustrations tended to de-contextualise their subjects. They privileged those parts of a plant or animal that were essential for accurate classification in accordance with the Linnaean system, but omitted details that were superfluous to this purpose – such as the roots of plants. They also stripped

⁵⁷ Mauricio Nieto Olarte, *Remedios para el Imperio*, p.121

⁵⁸ Caldas, 'Prefación a la Geografía de las Plantas', *Obras*, p.389

them of their cultural significance and suppressed overt references to their virtues and uses.⁵⁹

The Director of the Real Jardín Botánico, Casimiro Gómez Ortega, prescribed precisely this stylistic approach when he ordered José Brunete and Isidro Gálvez, the artists selected to accompany Hipólito Ruíz and José Pavón to Perú, to prioritise those plant parts with greatest taxonomical importance for special attention. In a set of instructions compiled for the members of the expedition, Ortega stipulated that the artists must take particular care in ‘the drawing of that or the other part that the Botanists consider most important for the knowledge and distinction of plants’, and, ‘where necessary, represent them separately and sometimes in an enlarged form’.⁶⁰ Should this be the case then they must ‘draw separately to one side of the general figure the parts of the flower, and of the fruit, dissecting these as the most essential [parts for classification]’.⁶¹

Naturalists working on the imperial periphery sometimes subtly subverted some of these conventions and developed their own distinct artistic styles. Beth Fowkes Tobin suggests that the intricate botanical drawings sketched by Mughal artists for the East India Company in the 1790s borrowed from native traditions, even though the British botanists William Roxborough and Nathaniel Wallich supervised

⁵⁹ Beth Fowkes Tobin argues that the typical late eighteenth-century botanical illustration was ‘diagrammatic, depicting the stem, leaves and flower of a plant against a white background’, and she notes how the parts of fructification were often dissected separately owing to their importance in Linnaean classification. See Beth Fowkes Tobin, *Picturing Imperial Power: Colonial Subjects in Eighteenth-Century British Painting*, Durham and London, Duke University Press, 1999, p.178. For further discussion of the artistic conventions associated with botanical illustrations see also Daniela Bleichmar, ‘Painting as Exploration: Visualising Nature in Eighteenth-Century Colonial Science’, *Colonial Latin American Review*, Vol.15, No.1, June 2006, pp.81-104, and Maricio Niceto Osorio, ‘Dibujar, ensamblar y nombrar especies: desplazamiento y apropiación de la naturaleza’ in *Remedios para el Imperio*, pp.67-99

⁶⁰ ‘Instrucción que deberán observar los dibujantes que pasan al Perú de orden de S.M. para servir con el ejercicio de su profesión en la expedición botánica’ in Hipólito Ruíz, *Relación histórica*, Vol. I, p.416

⁶¹ *Ibid.*, p.417

their work. 'The natural history illustrations produced by the Calcutta artists are', she argues, 'suffused with a Muslim delight in design and intricacy, which...worked to complicate and even undermine the static Platonic hierarchies of Linnaean botany, with its drive to run living structures into ideal types, converting them into manageable units ripe for incorporation into a world system'.⁶² Daniela Bleichmar intimates that Spanish botanist José Celestino Mutis' American artists also evolved their own unique elements, including 'a stronger penchant for symmetry' and the use of 'denser colours'.⁶³ These and other deviations were, she contends, deliberate, and did not result from the Americans' inferior skill. Mutis predicted, indeed, that their work would not be found wanting by contemporary Europeans. Reporting on the painters' activities in 1789, he promised that 'the plate that leaves my hands will not require new revisions from my successors, and any botanist in Europe will find there represented the delicate parts of fructification...which are the alphabet of Science, without the need to come and identify them in their native soil'.⁶⁴

If Mutis' botanical illustrations deviated perceptibly from their European counterparts then the natural history images collated by Jaime Baltasar Martínez Compañón, Bishop of Trujillo, represented an even more radical departure from established artistic conventions. Stationed in Peru from 1767 to 1790, Compañón supplemented his pastoral obligations with the study of local fauna and flora. The Bishop, like Mutis, enlisted American artists to sketch the natural products of his

⁶² Fowkes Tobin, *Picturing Imperial Power*, p.201

⁶³ Bleichmar, 'Painting as Exploration', p.91

⁶⁴ José Celestino Mutis, *Flora de la Real Expedición del Nuevo Reino de Granada*, Madrid, Ediciones Cultura Hispánica, 1954, Vol. I, p.123

diocese. He dispatched the resulting series of watercolours to Spain, along with a selection of ethnographic artefacts.⁶⁵

Compañón's natural history illustrations fluctuated in quality. Some were relatively crude in appearance, whilst others evidenced a greater degree of skill and sophistication. What many of Compañón's prints shared, however, and what differentiated them from the output of contemporary European artists, was the effort they made to situate Peruvian fauna and flora within naturalistic settings. They sketched plants and animals in their entirety, rather than portraying a single branch against a white background, and they attempted to capture their interactions with other living things.

Illustrative of this approach are Compañón's zoological prints, which often allude to the dietary habits of their subjects, or document the function of their most notable body parts. Compañón's anteater, for instance, excavates an anthill, the startled inhabitants of which scuttle obligingly up the insectivore's outstretched tongue (Fig. 1), whilst his 'large tiger', cavorts nonchalantly up a hillside (Fig.2). The Bishop's chameleon is positioned next to a conveniently coloured sprig of leaves, to showcase the efficacy of its curious defence mechanism (Fig.3). His chipichipi retains its expressive Amerindian name (Fig.4), and all of his monkeys appear in the act of eating – the lion monkey clasps half a melon between its toes (Fig.5), the black monkey savours a freshly peeled banana (Fig.6) and the white monkey is about to sink its teeth into an orange (Fig.7). Compañón's watercolours thus reference the

⁶⁵ For a sample of the ethnographic artefacts that Martínez Compañón remitted to Spain see Ana María Verde Casanova, 'Notas para el Estudio Etnológico de las Expediciones Científicas Españolas a América en el Siglo XVIII', *Revista de Indias* 40, 1980, p.93. María de los Angeles Catalayud Arrincero also summarises the Indian ceramics and other items that Compañón remitted to Spain, including 'pieces in the form of birds, reptiles and other animals, canocs, fruits, etc.', as well as vases, arrows and other articles. See María de los Angeles Catalayud Arrincero, 'El Real Gabinete de Historia Natural de Madrid', in Lafuente, Antonio, Peset, José, and Sellés, Manuel (eds.), *Carlos III y la Ciencia de la Ilustración*, Madrid, Alianza Editorial, 1988, p.220

sustenance and hunting techniques of Peruvian animals. They indicate how they relate to other living things, and how their anatomical features equip them to survive in their native environment.⁶⁶

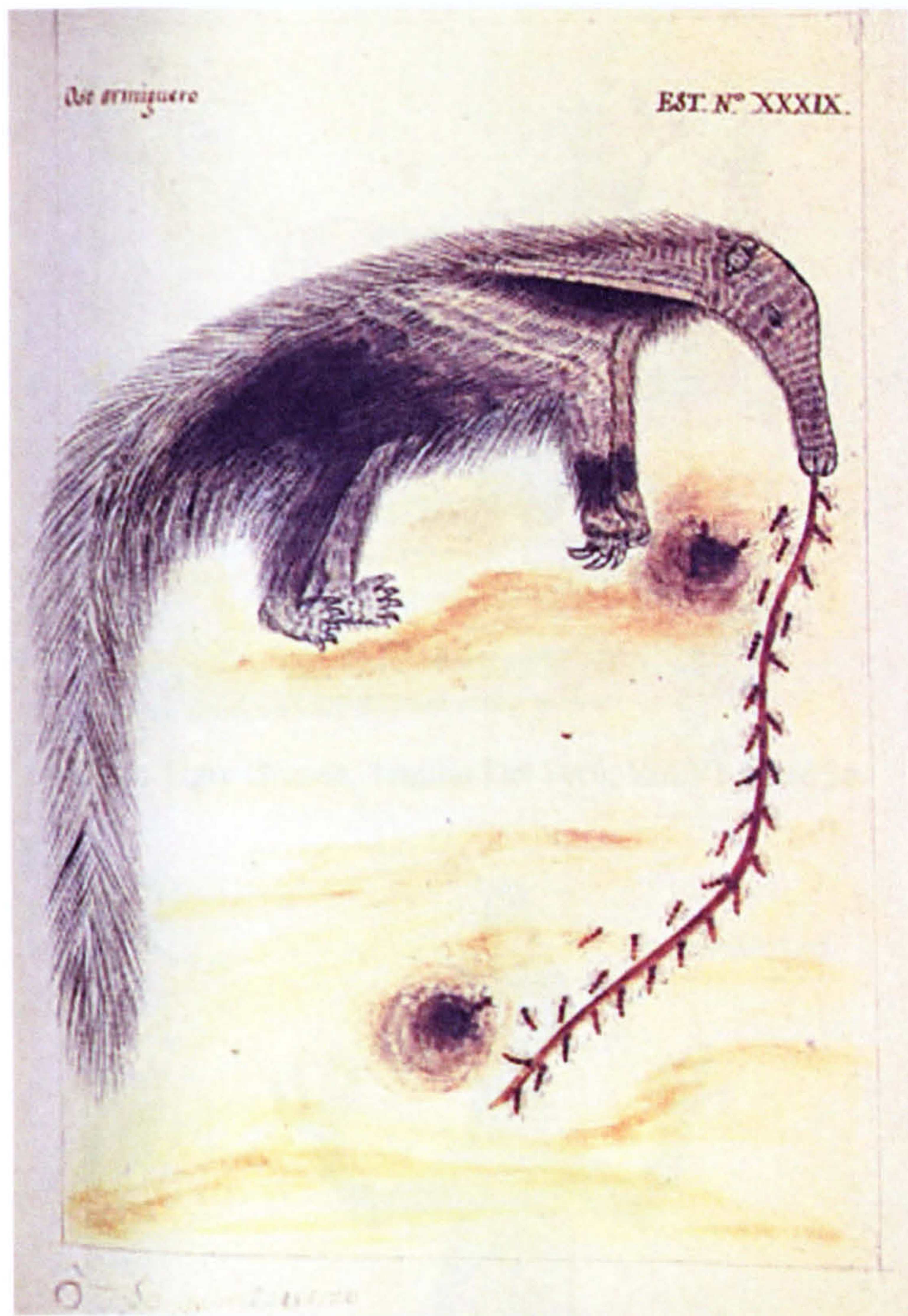


Fig.1: Oso hormiguero, Trujillo del Perú, Vol VI, Plate 39

⁶⁶ Compañón's watercolours are housed by the Biblioteca del Palacio Real in Madrid. They can be seen in the online collection entitled 'Manuscritos Americanos en las Colecciones Reales' at the following website: <http://www.cervantesvirtual.com/portal/patrimonio/catalogo.shtml>



Fig.2: Tigre Grande, Trujillo Del Perú, Vol.VI, Plate 36



Fig.3: Camaleón, Trujillo del Perú, Vol VI, Plate 77



Fig. 4: Chipichipi, Trujillo del Perú, Vol. VI, Plate 53



Fig.5: Mono Leoncito, Trujillo del Perú, Vol.VI, Plate 16



Fig.6: Mono Negro, Trujillo del Perú, Vol IV, Plate 12



Fig.7: Mono Blanco, Trujillo del Perú, Vol IV, Plate 16

Compañón's botanical drawings also contravene reigning stylistic conventions. Some picture the roots of plants – usually omitted by European artists (e.g. the 'clucoria'). Some position plants in a naturalistic setting (e.g. the 'pachachancas'), whilst others contain livestock in their branches - the sapote features an owl (Fig.8); the ytiningui includes a strange monkey-like being with a long tongue (Fig. 9). Unlike orthodox Linnaean illustrations, none of Compañón's prints shows a close-up of the sexual parts of the flower, and those that do enlarge a particular segment usually prioritise the leaves, fruit or roots, probably in deference to their practical uses. The Bishop's coca plant, for example, magnifies the leaves, which Velasco characterised as 'an incredible food source, because the Indians, without any other sustenance than these leaves, make voyages for weeks, finding themselves every day more robust and vigorous' (Fig.10).⁶⁷ Compañón's yucca, meanwhile, exhibits its tuberous roots, another staple in the Andean diet. 'The long, fat, white, delicate roots [are] of wonderful taste, either roasted or stewed', reported Velasco, and they are 'preferred to the best wheat bread. They grow to a surprising size in humid and hot climates', and 'one makes from them flour, bread, polenta and the best starch of all' (Fig.11).⁶⁸

⁶⁷ Velasco, *Historia*, p.34

⁶⁸ *Ibid.*, p.59



Fig 8: Sapote, Trujillo del Perú, Vol. IV, Plate 29



Fig. 9: Ytiningui, Trujillo del Perú, Vol. III, Plate 23



Fig.10: Coca, Trujillo del Perú, Vol. III, Plate 64

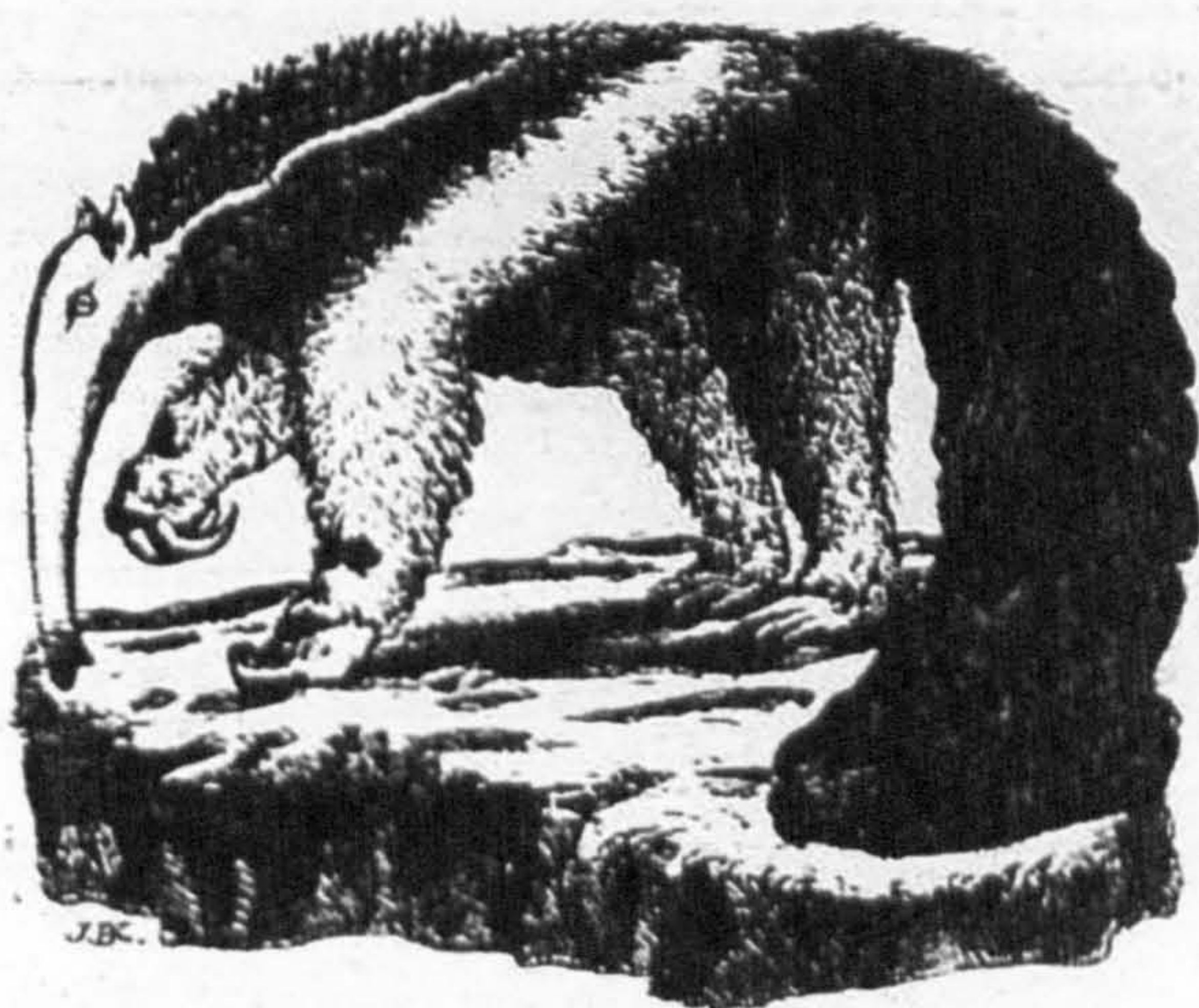


Fig.11: Yucca, Trujillo del Perú, Vol.IV, Plate 127

The distinctive qualities of Compañón's watercolours emerge most clearly when we compare them to other contemporary natural history illustrations. Unlike Trujillo's images, which inserted plants and animals into a naturalistic setting, more orthodox zoological and botanical drawings tended to divorce their subjects from their native environment. They excluded indications of a creature's diet or habits, and they often portrayed their subjects in somewhat contrived poses against a blank white background or on a fringe of non-descript foliage.

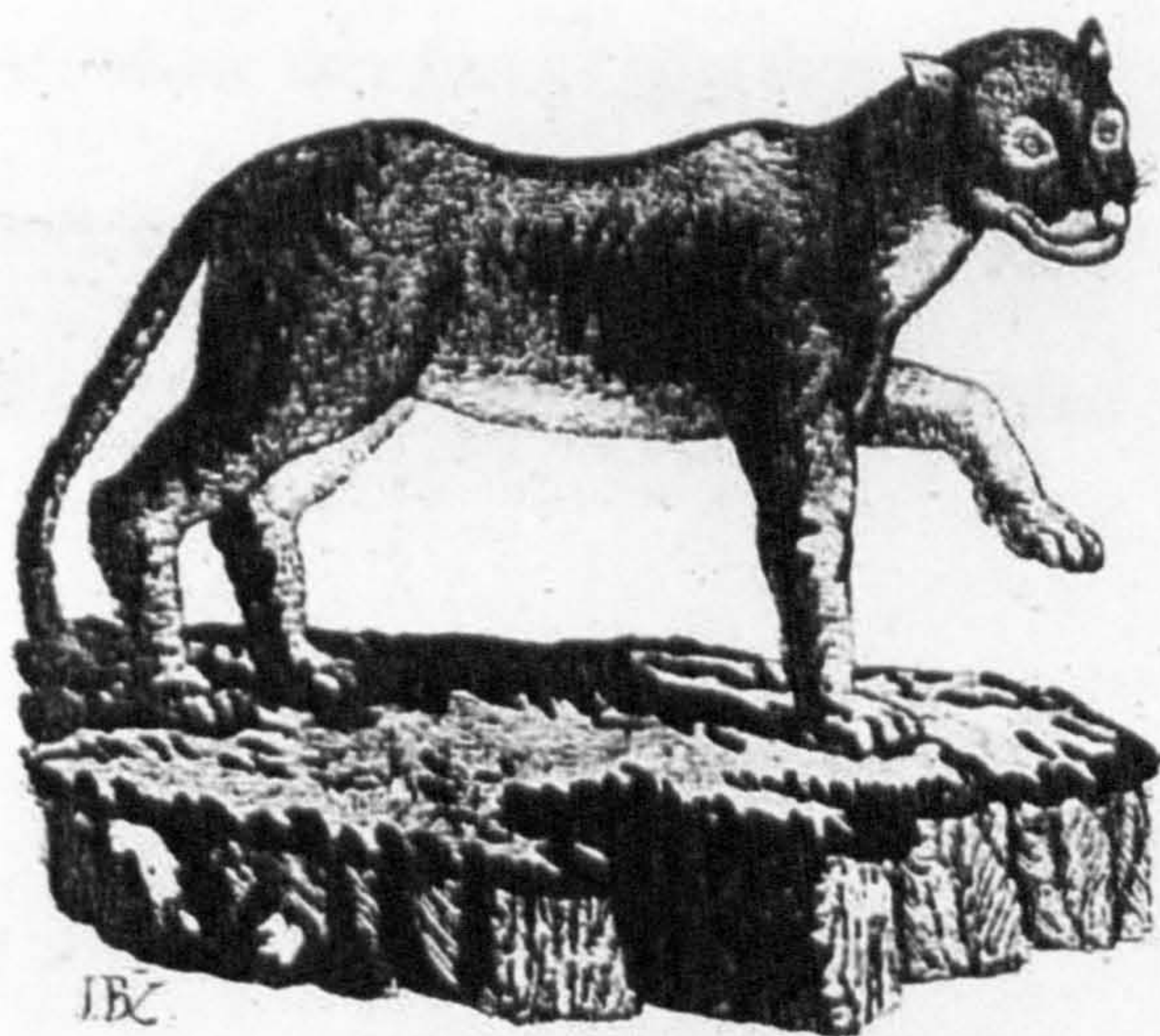
Emblematic of this approach were the zoological illustrations in Juan Bautista Bru's *Colección de láminas que representan los animales y monstruos del Real Gabinete de Historia Natural de Madrid* (1784), which featured a selection of animals from the Real Gabinete. Introducing the work, Bru announced explicitly that he had concentrated 'most particularly in this Collection on that which relates to the structure of the animals rather than that which concerns their habits'.⁶⁹ The Spaniard inserted a small scale in the corner of his paintings, to help viewers calculate the true dimensions of the beasts depicted, but he suppressed any reference to their behaviour or to their relations with other species, portraying them in static, rigid poses. Where Compañón's anteater molests an anthill, for example, Bru's specimen stands stiffly on a generic piece of turf, one foot raised to better display its powerful digging claws and its glorious tongue tucked away (Fig. 12). And where the Bishop's 'tiger' frolics merrily up a hillside, Bru's leopard adopts a rather unnatural posture and fixes the viewer with a glassy-eyed stare. The Spanish artist thus sacrificed naturalistic poses for anatomical accuracy (Fig. 13).

⁶⁹ Juan Bautista Bru de Ramón, *Colección de laminas que representan los animales y monstruos del Real Gabinete de Historia Natural* (2 vols.), Madrid, Imprenta de Andres de Sotos, 1784-1786, p.3



Osa Palmira.

Fig.12: 'Oso Palmera', from Bru de Ramón, Juan Bautista, *Colección de laminas que representan los animales y monstruos del Real Gabinete de Historia Natural*, Madrid, Imprenta de Andres de Sotos, 1784-1786, Vol. II p.34



Leo-pardo.

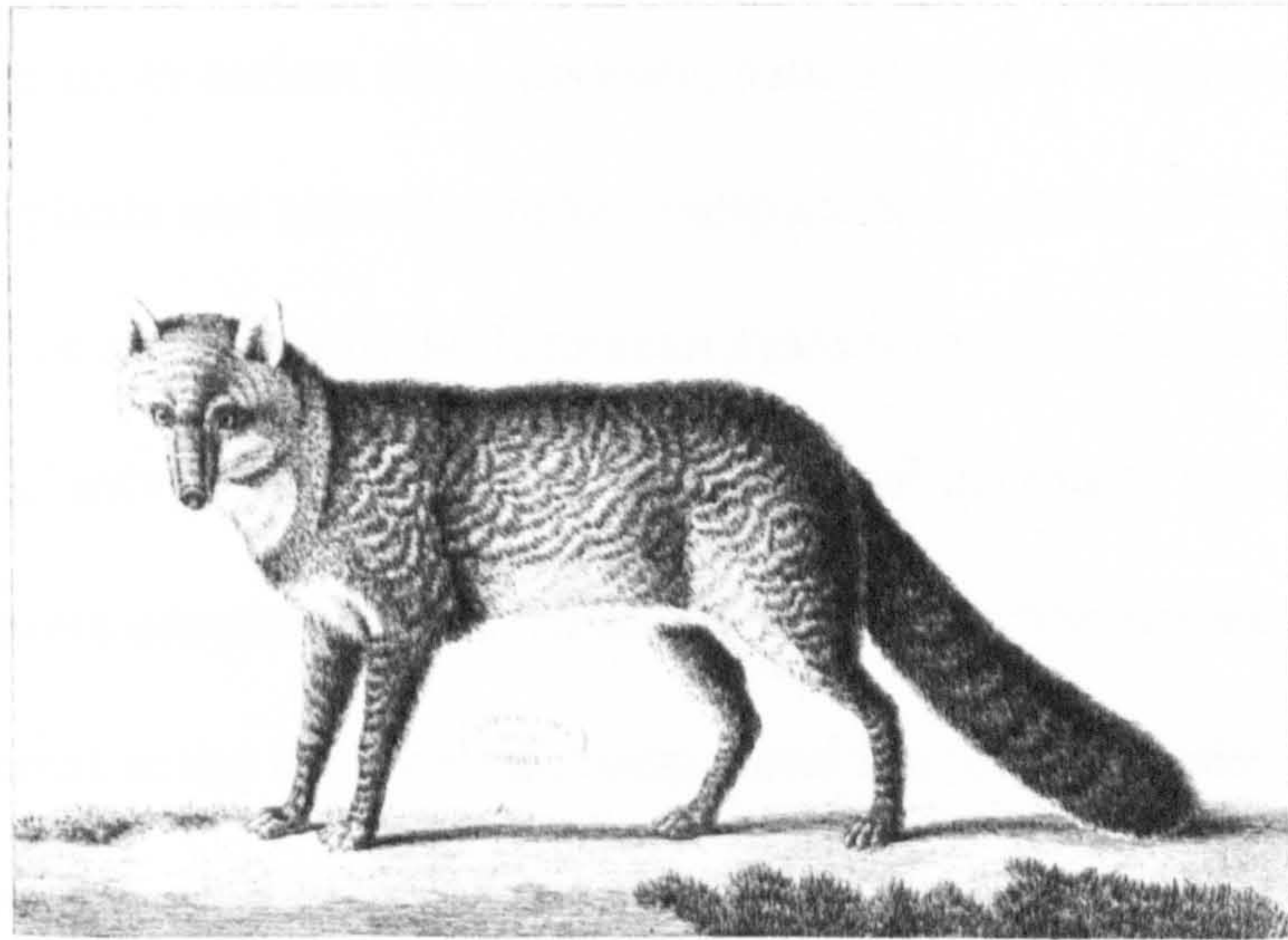
Fig.13: 'Leopardo', from Bru de Ramón, Juan Bautista, *Colección de laminas que representan los animales y monstruos del Real Gabinete de Historia Natural*, Madrid, Imprenta de Andres de Sotos, 1784-1786, Vol. II p.22

The set of plates produced to supplement the French edition of Félix de Azara's *Voyages* (1809) exhibit similar characteristics. Unable to draw Paraguay's birds and quadrupeds *in situ*, owing to the reputed lack of local artistic talent, Azara assented to the suggestion of the French editor Walckenaer that illustrations of his creatures be made from the specimens on view in the Musée d'Histoire Naturelle. Walcknaer contracted a Monsieur Prêtre to sketch the birds and a Monsieur Huet to portray the mammals, and Azara specified which beasts were to be drawn, noting those he had recognised in the Parisian museum.⁷⁰ The resulting illustrations closely resembled the prints made by Bru. As Marta Penhos has commented, 'the quadrupeds are presented in profile on a fringe of soil that occupies no more than a quarter of the composition'.⁷¹ Only one – the Agourachay (a type of fox) twists its head to face the viewer (Fig.14), whilst another, the Tamandua noir, supports its forelegs on a tree trunk (Fig.15). The foliage surrounding most of the creatures appears equally inauthentic, with 'the hints of vegetation' conforming less to 'the descriptions of Azara' than to 'conventional artistic guidelines', and there is no real sense of how different creatures interact, where they live or how they move.⁷² Azara who, as we have seen, set so much store by direct observation, was thus compelled to content himself with plates based on the stuffed specimens in a Parisian museum.

⁷⁰ Azara, *Viajes*, p.4. See also Azara's letter to Walckenaer on p.23, in which the Spaniard states which species he wishes to be drawn.

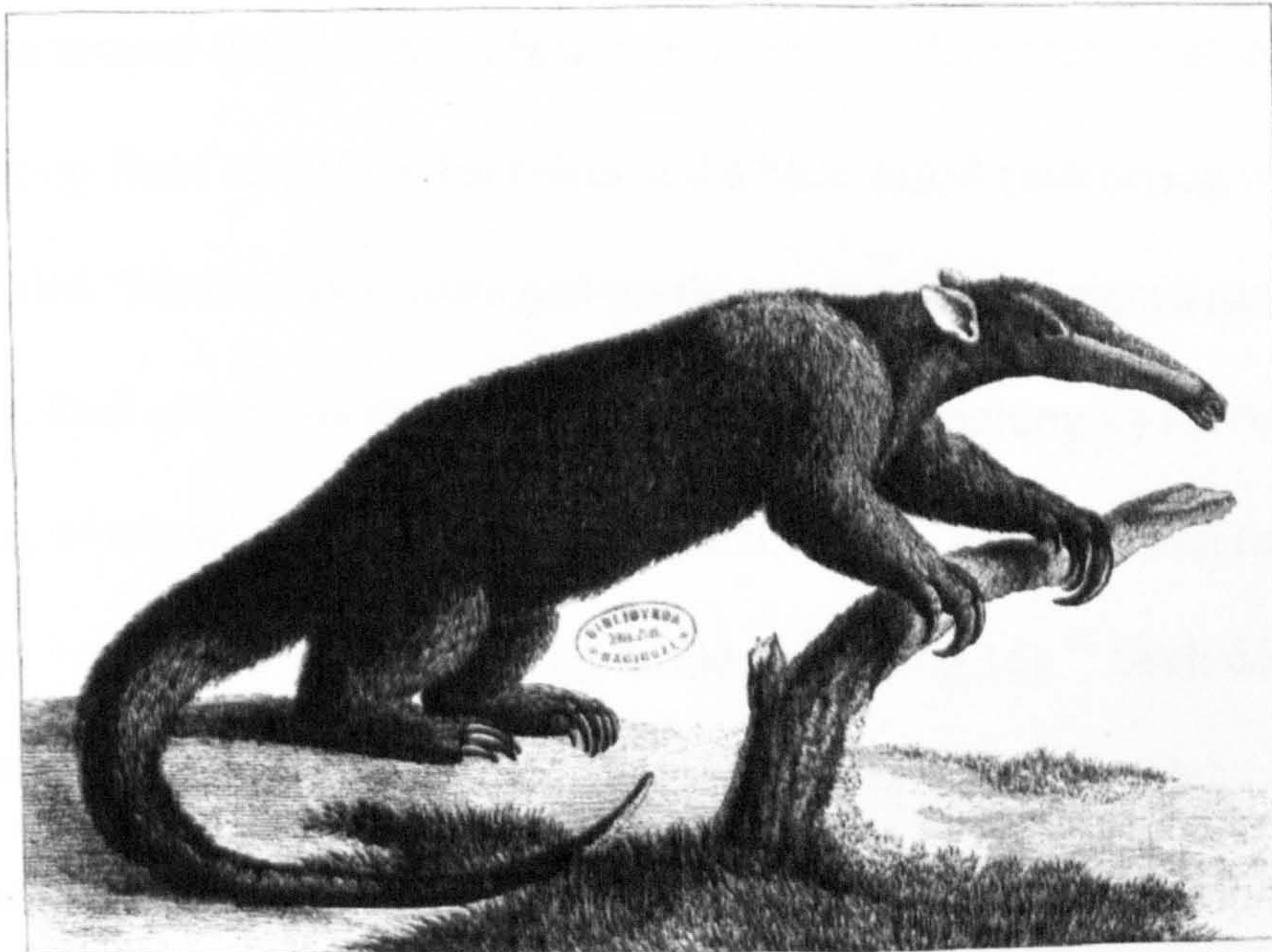
⁷¹ Penhos, *Ver, Conocer y Dominar*, p.219

⁷² Penhos, *Ver, Conocer y Dominar*, p.219



L'Agourachay ou Renard tricolor d'Amérique *Canus Canis-argenteus* Linn.

Fig.14: 'L'Agourachay ou Renard tricolor d'Amérique', from *Voyages dans l'Amérique Méridionale par Don Félix de Azara: Collection de Planches*, Paris, Dentu, 1809, Plate XII



Le Tamandua noir, variété du Tamandua ordinaire.

Fig.15: 'Le Tamandua noir', from *Voyages dans l'Amérique Méridionale par Don Félix de Azara: Collection de Planches*, Paris, Dentu, 1809, Plate VII

Compañón's watercolours flouted these reigning artistic conventions. They approximated instead to earlier, Pre-Linnaean, natural history illustrations, which tended to situate plants and animals within complex ecosystems or to reference their uses to man. Where adherents to the Linnaean system focused on depicting species with anatomical clarity, in order to ensure taxonomical accuracy, pre and anti-Linnaean illustrators adopted a more holistic approach to their subjects. They exhibited an interest in the lifecycle of animals and the interdependence of living things, displaying how they behaved, what they ate, and how they interacted.⁷³

Take, for example, the prints in Maria Sibylla Merian's *Metamorphosis Insectorum Surinamesium*. Published in 1726, before Linnaeus devised his classificatory system, Merian's prints of the Surinam's insects position their subjects in intricate, naturalistic scenes, recording how they evolve and how they coexist with other species. Merian's illustration of the jatropha moth features a delicate speckled moth fluttering around the base of a plant, a hairy caterpillar creeping along a leaf, a chrysalis hanging from one of the branches and a blue lizard clambering up its stem.⁷⁴ Her plate entitled 'Manioc root snake and moth', meanwhile, depicts a manioc plant with a snake coiled around its stem, a stripy caterpillar munching its leaves and a moth hovering overhead. It also portrays the plant's roots, one of which harbours a clump of eggs – presumably the offspring of the snake (Fig. 16).⁷⁵ Such details resemble Compañón's illustration of the 'mariposa de la seda', in which two elegant butterflies flutter around the plant from which they derive their name whilst three

⁷³ See Tobin, pp.179-183

⁷⁴ Maria Sibylla Merian, *Metamorphosis Insectorum Surinamesium*, Amsterdam, 1726, Plate 4. For a more detailed discussion of Merian's life and scientific work, see Kim Todd, *Chrysalis: Maria Sibylla Merian and the Secrets of Metamorphosis*, Orlando, New York and London, Harcourt Inc., 2007, especially pp.165-225

⁷⁵ *Ibid.*, Plate 5

yellow caterpillars chomp at the leaves and a chrysalis dangles in one corner, showing simultaneously the life stages of the insect and its intimate relationship to the silk plant (Fig.17).



Fig.16: Manioc Root Snake and Moth, from Maria Sibylla Merian, *Metamorphosis Insectorum Surinamesium*, Amsterdam, 1726, Plate 5



Fig.17: Mariposa de la seda, Trujillo del Perú, Vol VI, Plate 60

Perhaps more surprisingly, Compañón's watercolours also resemble the illustrations of another European naturalist – Buffon. Though a contemporary of Linnaeus, Buffon was a staunch critic of the Swede's system, which he considered artificial and mechanistic. The Frenchman eschewed it in his own work, and he portrayed the subjects of his popular *Histoire Naturelle* in action, 'inserted in natural surroundings, in relation with other animals and with man'.⁷⁶ In one of Buffon's plates, for instance, a female elephant suckles its calf (Fig. 18).⁷⁷ In another a polar bear eviscerates a freshly killed seal,⁷⁸ whilst in a third a tamarin scoffs a piece of fruit, in a pose reminiscent of Compañón's feeding monkeys.⁷⁹ Buffon's flying squirrel is portrayed in flight.⁸⁰ His anteater glowers menacingly at a troop of ants streaming past its nostrils, (Fig. 19)⁸¹ whilst his skunk displays its pungent scent gland for the viewer's inspection.⁸² Admittedly not all of the landscapes in which Buffon positioned his subjects can be considered strictly authentic; the aforementioned anteater is perched on a plinth in front of a Grecian ruin, and its relative, the silky anteater, sits in front of what looks suspiciously like a Medieval castle.⁸³ What all of the plates do share, however, is a determination to bring their subjects to life and to avoid the more clinical postures of contemporary zoological illustrations – a

⁷⁶ *Ibid.*, p.273

⁷⁷ George Louis Leclerc, Comte de Buffon, *368 Illustrations from Buffon's Natural History*, New York, Dover Publications, 1993, p.128, Plate 256

⁷⁸ *Ibid.*, p.86, Plate 172

⁷⁹ *Ibid.*, p.24, Plate 47

⁸⁰ *Ibid.*, p.54, Plate 108

⁸¹ *Ibid.*, p.44, Plate 87

⁸² *Ibid.*, p.100, Plate 200

⁸³ *Ibid.*, p.44, Plates 87 and 88

characteristic which probably goes a long way towards explaining their popularity amongst non-expert readers. Compañón's prints also exhibited this characteristic, though his artists probably departed from Linnaean dictates out of ignorance rather than defiance.

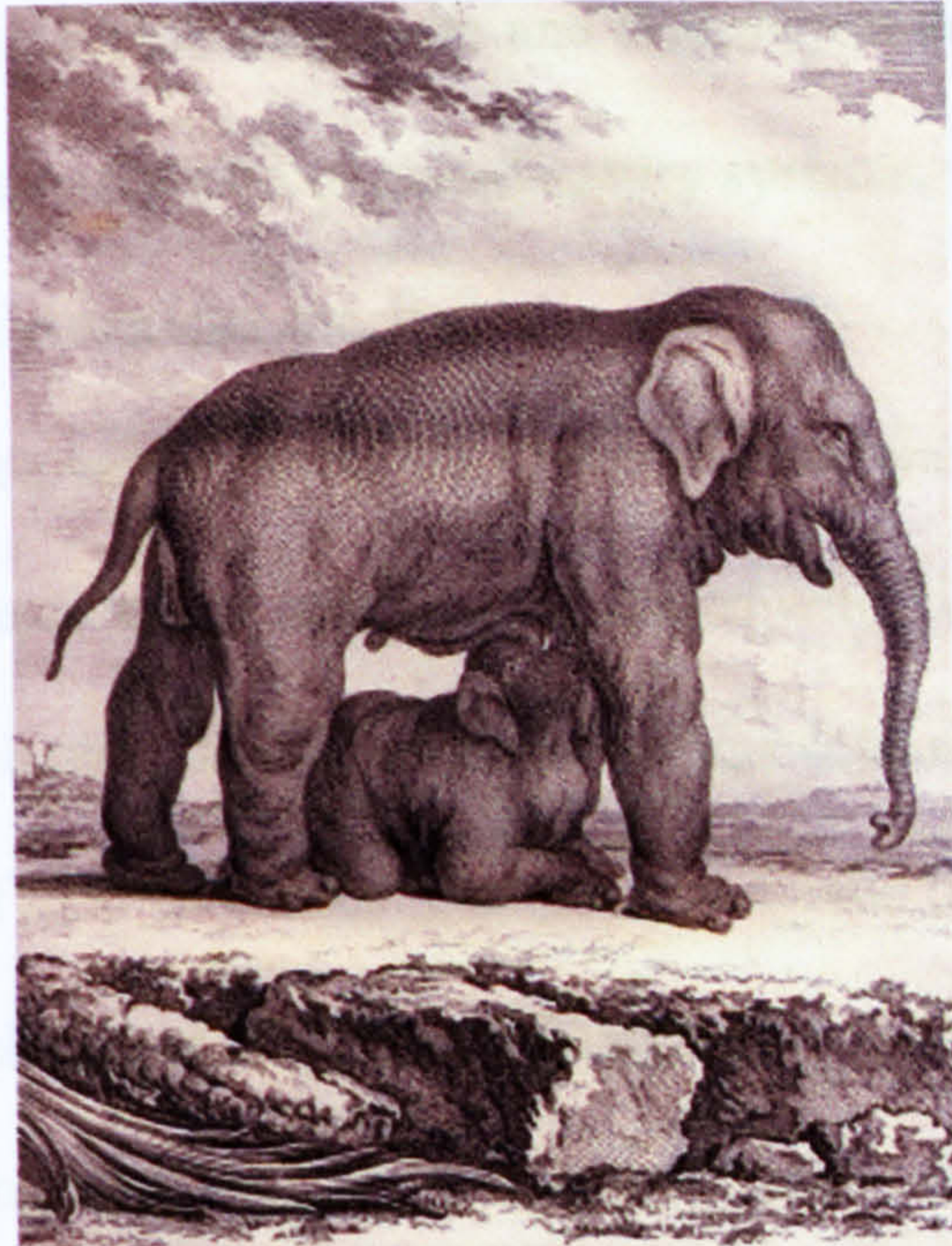


Fig.18: George Louis Leclerc, Comte de Buffon, *368 Illustrations from Buffon's Natural History*, New York, Dover Publications, 1993, p.128, Plate 256



Fig.19: George Louis Leclerc, Comte de Buffon, *368 Illustrations from Buffon's Natural History*, New York, Dover Publications, 1993, p.44, Plate 87

Breaking the Mould

If Compañón's artists violated European scientific conventions subtly and perhaps unconsciously, other creole savants were more outspoken. They subverted the precepts that governed contemporary science. They insisted that theories devised in Europe could not accommodate the singularity and diversity of new-world fauna and flora, and they opposed the imposition of classificatory systems, which, in their view, obscured the true nature of American species.

One creole with reservations about European systems was Unanue, who, though a convert to Linnaean botany, was less impressed with Pieter Camper's craniological theory, which ranked different racial groups according to their facial angle – that is, the slant of their foreheads. Camper, as Unanue observed, had identified 'the arched forehead' as the prime indicator of physical beauty and mental agility. He had deduced from this that the European, whose forehead gave a measurement of 90° to 80°, was more intelligent than the Asians and Americans, whose respective measurements were 80° to 70° and 75° to 70°, and the African, whose measurement of between 70° and 60° placed him only slightly above the orang-utan.⁸⁴

Unanue disputed this theory, arguing that, if it accurately represented the current positions of the races, then it did not hold true for past eras. The Peruvian conjectured that 'returning to previous centuries, guided by the thread of history, we will find the nations of Asia and Africa inventing the arts, the sciences and the laws, bringing their light to all lands and making it shine like a bright torch when Europe was a country of savage men'. He alleged that 'the Europeans who today triumph in the other parts of the globe, *no less through the energy of their pens than through the*

⁸⁴ Unanue, 'Observaciones Sobre el Clima de Lima', in *Obras*, pp.71-72

force of their arms, have erected themselves as a tribunal and sentenced in their own favour, depriving the other three parts of the earth of that which is most dear to man; beauty in the body and talent in the soul'⁸⁵. He also noted pointedly that 'when Great Britain was first visited by the Phoenicians, the inhabitants were painted savages, much less civilised than those of Tongataboo or Tahiti'.⁸⁶ As such statements illustrate, Unanue's rejection of Camper's facial angle constituted a spirited denunciation of euro-centric racial models and betrayed a keen awareness of the close links between science and empire. It may, moreover, have struck a particularly poignant chord with his fellow creoles, many of whom were not free from the taint of Indian and African blood - the Liberator Simón Bolívar, was, for instance, reputed to have an African ancestor, whilst the Argentine politician Bernardino Rivadavia was dubbed 'Dr. Chocolate' by his enemies, on account of his supposed African heritage.⁸⁷

An even more vociferous enemy of European theories was the Mexican Alzate. A rabid opponent of all system builders, Alzate spluttered with indignation at attempts to regiment Mexican flora and fauna and delighted in adducing local phenomena that confounded supposedly universal systems. The Mexican chortled smugly that 'the natives of New Spain feed on plants and fruits that should be considered poisonous, were botanical legislation correct'.⁸⁸ He exuded equal glee upon proving – at least to his own satisfaction – that certain American species defied

⁸⁵ Ibid., p.71 (my italics)

⁸⁶ Ibid., p.73

⁸⁷ George Reid Andrews, *The Afro-Argentines of Buenos Aires, 1800-1900*, Madison, University of Wisconsin Press, 1980, p.183

⁸⁸ 'Carta en defensa de la Botánica y de los infundados reparos que el Autor de la Gazeta Literaria de México opone contra el Sistema de Linneo, escribe al Director del Jardín Botánico uno de sus alistados Discípulos', *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, Madrid, Imprenta Real, December 1786, p.206

classification according to the Linnaean system, on account of their structural anomalies. 'There are in New Spain productions that invalidate and overturn all hypotheses and established botanical systems', Alzate gloated impishly.⁸⁹

Alzate disliked Linnaean botany because it wrenched Mexican plants from their native context, silencing important information about their virtues and uses. The American suspected that Linnaeus' excessive attention to the reproductive organs of plants would corrupt 'the vulgar spectator', by showing him vivid 'representations of that which nature executes in private',⁹⁰ and he bridled at the sheer audacity of the Swede, who proposed to classify the productions of the entire world with a taxonomical model concocted in Scandinavia. 'De Pauw has already confused many savants in Europe with his strange paradoxes regarding the Egyptians, the Chinese and the Mexicans', fulminated Alzate, 'and it seems to me very similar the case of he who, enclosed within four walls, summons all the plants to his tribunal in order to impose new names upon them and to classify them as venomous or however he wishes'.⁹¹

The opposing standpoints of the metropolitan and the colonial naturalist are illustrated with particular clarity in a series of letters that appeared in the *Gazeta de México* in 1788, following the establishment of a botanical garden in Mexico City.

⁸⁹ Ibid., p.208

⁹⁰ 'Carta que en defensa de la Botánica', p.104

⁹¹ José Peset, *Ciencia y Libertad: el papel del científico ante la independencia americana*, Madrid, CSIC, 1987, p.77. Few creoles were quite as militant as Alzate, but several expressed reservations about European classificatory systems or proposed certain revisions. The Uruguayan Larrañaga, for instance, generally adhered to Linnaean taxonomy, but introduced certain of his own 'innovations' when he classified the province's mammals, since 'we are all permitted to methodise'. The Chilean Molina, meanwhile, conformed to Linnaeus' system, but only because it was the one 'most generally followed'. Introducing his natural history of Chile, Molina professed certain doubts about the wisdom of the Swede's nomenclature, 'which displeases me in many points', and he confessed that, given a free choice, 'I would rather have followed Waller or Bomare in mineralogy, the great Tournefort in botany and Brisson in zoology'. See Letter from Larrañaga to Aimé Bonpland, 25 May 1818, in Larrañaga, *Escritos*, p.269, and Molina, *Compendio*, pp.xi-xii.

The authors of the letters were the aforementioned Alzate, who repudiated the teaching of Linnaean botany in America, and an anonymous individual purporting to be a disciple of Vicente Cervantes, the Spanish director of the garden, who defended the Swede's classificatory system. Both men descended to personal jibes in their respective letters. Looking beyond the acrimony and the verbal jousting, however, we find a more profound cleavage between the universal and the local, as Alzate and his antagonist debated the usefulness of Linnaean taxonomy, its practical advantages and its suitability for Mexican flora.

Addressing the first of these issues, for example, the Disciple propounded the benefits of a workable classificatory system for plants and dismissed Alzate's allegation that Linnaeus' model complicated the study of botany. 'Would the most rustic individual, seeing a Library without order, say that the difficulties of finding a book would increase if the texts in folio were separated from those in quarto, supposing that the sizes distinguished the material?' retorted the Disciple. And was it not likewise true that 'the simple Merchant in his shop and the rudest Official in his work arrange naturally for their own convenience the distribution of their instruments, in order to find promptly those that are requested of them or which they require for their own use'? 'The same happens in the science of plants', concluded the Disciple, 'for its study would be tiresome and irritating if, lacking in methods, we had to verify the name of a species through the mark that distinguishes it from others of its genus'.⁹²

Unmoved by these persuasive metaphors, Alzate countered that if Linnaeus was a librarian, then he was an 'extravagant' and illogical one who organised his books in an arbitrary fashion, and in some instances on the basis of details that

⁹² 'Carta que en defensa de la Botánica', p.79

‘cannot be examined without the help of a good microscope’.⁹³ The Mexican complained that Linnaeus’ cataloguing system divulged no information about ‘the intrinsic value of the volumes’ and the nature and quality of their contents. He chided the Swede for relying on seasonal characteristics such as the parts of the flower to classify American flora, and he maligned Linnaean plant names for concealing the medicinal properties of local herbs, often encapsulated in their Nahuatl equivalents. ‘When you see a plant for the first time (and careful, for you must arrive when the plant is in flower), you know that it belongs to such and such a genus’, jeered Alzate.

But what do you deduce from all this? If you are struck down by some illness, for example, on the coasts of the southern sea, in which the plants are very different from those of cold countries, would you dare to take a medicine made from a herb that you know not from its effects, but from its appearance? Or would you not wait until the Rustic or the Curandera [healer] came along and apprised you of the useful or pernicious [qualities] of the plant?⁹⁴

Alzate insisted that he was not alone in doubting Linnaeus’ system, and he paraded his acquaintance with key European authors who shared his misgivings. The Mexican professed to have ‘read the principal works by the best naturalists’.⁹⁵ He referred at one point to the botanist Tournefort, ‘whose works the Antimethodist has thumbed’,⁹⁶ and he quoted extensively from naturalists such as Quercetanus, Kramer, Bomare, Buffon and Heister, whose approach to natural history coincided with his

⁹³ ‘Carta satisfactoria, dirigida a un Literato por D. Joseph de Alzate, Autor de la Gazeta Literaria, sobre lo contenido en el suplemento a la de México de 16 de Mayo en 1788’, *Gazetas de México*, Suplemento a la Gazeta de México del Martes 24 de Junio de 1788, pp.94-95

⁹⁴ *Ibid.*, p.96

⁹⁵ *Ibid.*, p.100

⁹⁶ *Ibid.*, p.98

own.⁹⁷ Arguing that botany should take into account the local circumstances of plants, for example, Alzate summoned the testimony of ‘one of the best naturalists in Europe, Mr. Bomare’, who had remarked that ‘one cannot acquire knowledge relating to the vegetable kingdom, if he does not possess the necessary instruction concerning their birth, growth and multiplication...in other words, if he does not understand the influence of the land and the climate’.⁹⁸ The Mexican also gleefully regurgitated Buffon’s objections to Linnaeus’ system of animal classification, delighted that the esteemed French naturalist shared his misgivings about the new category of ‘mammals’.⁹⁹ ‘The Animal System of Linnaeus has been combated and even ridiculed by the Count of Buffon, with reason’, smirked Alzate. ‘For is it not the most comic thing to see Man placed in the same class as the Bat?’¹⁰⁰

Responding to these objections, the Disciple resorted to similar blend of sarcasm and name-dropping. He accused Alzate of using European scientific literature selectively, ‘looking for the quotations of authors opposed to the Linnaean system’.¹⁰¹ He impugned Alzate’s credentials as a savant, suggesting that the American’s outlandish claims stemmed from ‘the great confusion with which he interprets what he reads’,¹⁰² and he dismissed many of the scientific discoveries Alzate purported to have made in New Spain as feeble copies of existing innovations, crediting him only with the invention of a toxic form of soap. The Disciple surmised that most of

⁹⁷ Ibid., footnote pp.93-94

⁹⁸ Ibid., p.96

⁹⁹ Ibid., p.95

¹⁰⁰ Ibid., footnote p.97

¹⁰¹ ‘Al Sr. Director del Real Jardín Botánico. Respuesta del Discípulo a la Carta Satisfactoria, en la que se impugnan las objeciones que propone su Autor contra el Systema de Linneo’, *Gazetas de México*, Suplemento a la Gazeta de México del Martes 15 de Julio de 1788, p.113

¹⁰² Ibid., p.119

Alzate's criticisms of Linnaeus were based upon misunderstandings and a reliance upon outdated sources, and he cruelly deflated the Mexican's claim that he was on intimate terms with the foremost savants of the day, insinuating that, had Alzate truly been an associate of the prestigious men he cited, then he would have conducted himself with more restraint. 'If his relations with educated persons [gentes cultas] are so frequent,' sneered the Disciple, 'then he should have learned from them not to declaim against the method of study that His Majesty commands in his Real Jardín Botánico, in order not to distract the application of the young, nor to make them doubt the good concept that they have formed of the doctrine of Linnaeus'.¹⁰³

The details of this tortuous debate are worth relating at length because they illustrate both the quibbles that creole savants had with European systems and the manner in which they framed their objections. The dispute between Alzate and Cervantes was, in many ways, a clash of epistemologies in which Cervantes, the imperial servant, championed universal systems, and Alzate, the colonial subject, relished the singularity of Mexican fauna and flora. Both men, however, situated their arguments within the existing scholarly debate, summoning European authors to strengthen their cases for and against Linnaean botany, and this rhetorical tactic suggests that even American writers, who harped repeatedly on the need to local expertise and experience, still felt the need for external validation. Alzate's bid for scientific credibility thus exposes some of the contradictions in creole science, and the latter's continued dependence on the very old-world models that it at other times criticised.

¹⁰³ 'Respuesta del Discípulo', p.119

Creole Patriots?

To some extent, the study of nature fortified creole patriotism. It convinced Americans of the economic and scientific potential of their native regions. It fostered a sense of epistemological solidarity in opposition to armchair philosophers and travellers, and it inspired creole naturalists to undertake research that would honour and glorify their native lands. The New Granadan Francisco Antonio Zea proclaimed that ‘the animal kingdom alone could occupy our future naturalists for many years and be a fertile source of riches when we begin to open our eyes to our interests’.¹⁰⁴

An article in the *Mercurio Peruano* declared that ‘the Natural History of Peru is fertile in prodigies’, predicting that ‘all the systems that have been devised in Europe concerning this material will be subject to a thousand amplifications when they are applied here’,¹⁰⁵ whilst Caldas cast New Granada as an ideal theatre for scientific investigations, in which ‘aromas, balsams, precious woods, different palm trees, medicinal herbs, unknown flowers, colourful birds, bands of saínos (*sustajassu L.*), numerous families of monkeys, diverse amphibians, useful insects, [and] venomous reptiles call the attention of naturalists’.¹⁰⁶ The New Granadan not only savoured these bountiful productions, but proposed to distinguish his homeland by being the first to classify and map them. ‘The Baron [Humboldt] has spoken to me of a savant, whose name escapes me, who has begun to work [on a zoological map]’, meditated

¹⁰⁴ Mutis, *Flora*, Vol. I, p.70

¹⁰⁵ ‘Idea General del Perú’, *El Mercurio Peruano*, Tomo I, 1791, Edición Facsimilar, Biblioteca Nacional del Perú, 1964, p.6

¹⁰⁶ ‘Estado de la Geografía del Virreinato de Santafé de Bogotá, con relación a la economía y al comercio’, in Caldas, *Obras*, p.191

Caldas. 'His observations, his ideas, will perfect our own, and our labours will be appreciated as the first of this species executed in America'.¹⁰⁷

Whilst the study of nature thus quickened patriotic sentiments and engendered tensions between metropolitan and colonial savants, it should not necessarily be interpreted as some kind of catalyst for independence. Once the independence process was underway, a number of American naturalists *did* support the patriot cause, and some perished at the hands of royalist troops – notably Caldas, executed on the orders of General Pablo Morillo in 1816. The actions of these individuals in the chaotic years after 1808 do not, however, reflect their attitudes and expectations prior to Napoleon's invasion of Spain, and an examination of their pre-1808 writings suggests a more conservative, more nuanced conception of the function and significance of their scientific attainments. Renan Silva states, for instance, that 'there is not a single text by the [New Granadan] ilustrados, of those that are known, that enables one to confirm, before 1808, [the existence of] an idea of nation distinct from the Spanish nation'.¹⁰⁸ Lucia Duque Muñoz contends, similarly, that creole savants evinced 'a sentiment of belonging towards Spain', a feeling of 'pride towards their peninsular ancestors' and a desire to defend the metropolis from the slanders of northern European critics.¹⁰⁹

Take Caldas, for example. Though occasionally critical of the Spanish authorities for their lack of support, and of Mutis for his failure to accord the creole a more prominent position within the Botanical Expedition of New Granada, Caldas

¹⁰⁷ 'Memoria sobre el plan de un viaje proyectado de Quito a la América septentrional, presentada al célebre director de la Expedición Botánica de la Nueva Granada, Don José Celestino Mutis', in Caldas, *Obras*, p.314

¹⁰⁸ Silva, *Ilustrados*, p.619

¹⁰⁹ Lucia Duque Muñoz, 'Patriotismo, Geografía y Astronomía en la coyuntura independentista de la Nueva Granada (1808-1810)', *C.M.H.L.B Caravelle* 83, Toulouse, 2004, p.170

generally emphasised his fidelity to Spain, graciously accepting the encouragement he received from Spanish officials and applauding the accomplishments of Spanish savants. Writing to the Viceroy Antonio José Amar y Borbón as late as 1809, the creole reported that he had baptised two species of plant in his honour – *amaría puctea* and *amaría violácea*. He rhapsodised that ‘in the most critical circumstances of the Nation, when it seemed that a chief could scarcely grapple with the grave and thorny matters of the Government, Your Excellency has had sufficient time to enact these with glory, and also to sustain and reanimate the sciences’, and he urged Amar y Borbón to ‘accept with gratitude this dedication, inspired by your virtues, by your merit and by the love you profess for useful knowledge’.¹¹⁰

Elsewhere, in a study of Bogotá’s geography, Caldas enunciated some equally laudatory comments about a Spanish subject, in this case the cartographer Salvador Fidalgo. The creole praised the accuracy of Fidalgo’s hydrographical charts, which ‘have assured forever the fortune and lives of all those who navigate our seas’, and he also adduced the achievements of the cartographer and several of his compatriots as evidence of the injustice of Masson’s notorious portrayal of Spain. ‘It has been said that the Maritime Atlas of Spain, produced by the famous Tofiño, is an irreproachable response to Masson’s infamous question: what has Spain done for humanity’, snorted Caldas. ‘We could add that the hydrographical charts of Fidalgo will puncture the pride of this impudent geographer [Masson] who has insulted an enlightened and generous nation, and that the country [patria] of Juan, Ulloa, Mazarredo, Tofiño, Mendoza, Doz, Chaix, Galeano, Churruca, Ciscar and a numerous army of men famous in the sciences will oppose him as proof without question of its progress and

¹¹⁰ ‘Informe al Virrey’, in Caldas, *Obras*, p.229

enlightenment',¹¹¹ Caldas thus defended Spain's much maligned scientific record, as well as stressing the scholarly achievements of his fellow New Granadans.

Other creoles echoed Caldas' professions of loyalty to the Spanish Crown, expressing similar faith in its competence and progressiveness. An article on mining and chemistry in the *Mercurio Peruano*, for example, exalted the 'enlightened ministers' who 'protect the sciences and useful arts, occupying themselves seriously with physics, chemistry, Natural History and mineralogy'.¹¹² The Mexican Alzate, meanwhile, moderated his tirade against Linnaean botany with an outburst of gratitude towards the Charles III for having patronised the sciences in New Spain. He concluded his exposition on the defects of the Swede's classificatory system with a rather tame reflection on the potential benefits to be derived from the new botanical garden in Mexico City, and he characterised 'the establishment of the Real Jardín Botánico de Nueva España' as 'one of those great enterprises that can only be effected by the greatest of Kings, a true father to his vassals'.¹¹³ Such comments hardly amount to a rampant desire for political independence, and, though some were no doubt uttered for tactical reasons – e.g. to attract patronage or avoid persecution – they suggest a certain unity between the monarchy and its enlightened American subjects, and a wish, on the part of the latter, to serve not only their native 'patria', but also the larger Spanish 'nación'.

If the stance of creole naturalists did not amount to a full-blown repudiation of Spanish rule, however, then it did betray a growing sense of regional pride and a

¹¹¹ Caldas 'Estado de la Geografía del Virreinato de Santafé de Bogotá, con relación a la economía y al comercio', *Obras*, pp.206-207

¹¹² 'Anuncio de una Disertación didáctica de Minería, y de otros rasgos de Química y Física, remitidos a la Sociedad', *Mercurio Peruano*, 22 March 1792, Lima, 1964, Vol. IV, p. 196

¹¹³ Carta satisfactoria', *Gazetas de México*, p.104

subtle difference in emphasis. Where Spanish savants viewed America as a source of natural riches for Spain's use, their creole counterparts concentrated on the advantages they offered to their individual homelands. And where Spaniards solicited specimens for the Real Jardín Botánico and the Real Gabinete, American scholars, whilst providing copious plants and animals for their Spanish masters,¹¹⁴ dreamed of establishing similar institutions in their native colonies. As Nieto has commented in his analysis of the authors of the *Semanario del Reino de Nueva Granada*, 'if we consider it problematic to identify the thinking of the creole elites whom we find in the *Semanario* with the ideals of national independence, we may see them as expressions of private interests, relevant to the social groups to which the authors belong, that on occasion differ from, and even enter into conflict with, the political and commercial projects of the peninsula'.¹¹⁵

This conflict in priorities emerges quite clearly if we compare two different assessments of Mutis' botanical establishment in New Granada. The first assessment, penned by Mutis' creole protégé, the zoologist Jorge Tadeo Lozano, focused on the benefits that the botanical expedition would confer upon Mutis' adopted patria and cast the Spanish botanist as an honorary American. The second evaluation, contained within a letter by the Spanish General Pascual Enrile during the pacification campaign of 1816, emphasised the expedition's contribution to metropolitan science. He portrayed Mutis unambiguously as a Spanish patriot and a credit to the land of his birth.¹¹⁶

¹¹⁴ Sinforoso Mutis, for example, collected a herbarium of plants from Cuba and 'made numerous remissions of skeletons and seeds to the famous Cavanilles, then Director of the Real Jardín'. See 'Botánica' in Caldas, *Obras*, p.32.

¹¹⁵ Nieto Olarte, *Orden Natural*, p. 151

¹¹⁶ Enrile personally supervised the execution of Lozano and his cohorts Caldas and Salvador Rizo, appropriated the remnants of Mutis' notes, illustrations and collections for Spain. See Letter from

Lozano's account of the botanical expedition synthesised fidelity to the Crown with a tacit regional pride. The creole characterised the Real Expedición Botánica de Santa Fé de Bogotá as 'the most beautiful in the city, and the most suitable for exciting the tender affection of vassals towards the sovereign that protects and sustains it in order to make them happy'. He proceeded, however, to enumerate the agricultural and scientific benefits that the expedition would bequeath specifically to New Granada, before terminating his summary with a blend of imperial and patriotic optimism. 'On the precious life of the Director [Mutis] depends not only the completion of his masterful works, a glorious monument that will immortalise their Author, the Nation that produced him [Spain] and the pious Monarch who has sustained him', rhapsodised Lozano,

but also the realisation of the vast and patriotic projects that he has meditated, including the building in the Real Casa de la Expedición of two facades in whose enclosure one may comfortably position the library, the cabinet of natural history and a chemical laboratory, leaving between these buildings enough space for a botanical garden that may serve as a school for this faculty, with everything at the disposition of the public, who may enjoy it on certain days designated for that purpose.

The creole rejoiced that 'when this comes to pass, the capital of Santa Fé de Bogotá can glory in possessing in its centre a complete museum'. He anticipated that the latter would facilitate 'brilliant discoveries that are directly useful to the human race in general *and in particular to these Provinces, which through its offices will extract*

Pascual Enrile, 14 March, 1817, Fragata Diana, La Habana, in José Celestino Mutis, *Flora de la Real Expedición del Nuevo Reino de Granada*, Madrid, Ediciones Cultura Hispánica, 1954, Vol. I

the value from the exquisite and numerous productions with which Nature has enriched in the three kingdoms mineral, vegetable and animal.¹¹⁷

If Lozano thus relished both the regional and imperial benefits of Mutis' expedition, Enrile, by contrast, trumpeted only the latter. The Spanish General adjudged Mutis' contribution to science 'an immortal work...that provides authentic and evident testimony to the enlightenment of the Spanish Nation'. He grudgingly acknowledged the input of creole savants such as Caldas and Rizo, who had done an impressive job of mapping the viceroyalty and charting its fauna and flora, but he remarked with undisguised bitterness that the knowledge acquired by these individuals 'had turned them against the very people to whom they owed their enlightenment'. Concluding his report, Enrile explained that he had salvaged what he could from Mutis' battered establishment, remitting to the crown 'all that corresponds to botany' as well as 'the largest known grain of platinum and a young, monstrous and rare eagle', and he expressed the hope that these remissions would further 'the progress of the human race' (not specifically the inhabitants of New Granada). The Spaniard closed his letter with a ringing endorsement of his superior General Pablo Morillo who, 'chosen to destroy discord in the vast possessions of the king in Costa Firme, has not only achieved this rapidly, and at minimal cost, but has not found

¹¹⁷ Mutis, *Flora*, Vol. I, pp.84-85 (My italics). Alzate also consistently emphasised the importance of scientific knowledge that conferred tangible practical benefits. Defending himself from the slurs of Cervantes' disciple, the Mexican insisted that 'I am not a systematic botanist because I see that in physics systems are worth nothing', and he reeled off a lengthy list of his own scientific discoveries, all of which offered immediate advantages to New Spain. 'I am not a botanist by profession', confessed Alzate, 'but everyone knows, or should know, since it was publicised in the press, how, in the recent years of 85 and 86, years of poverty, I communicated to the Government the plan for the sowing of maize in warm lands during winter, a policy that served to free us from the hunger that was threatening us. This is what it means for a devotee to execute true botany. If I had confined myself to being a simple speculator and counter of stamens, I would probably not have been useful to men'. See Alzate, 'Carta Satisfactoria', p.102.

sufficient obstacles from the Mexican empire to that of Peru to distract him from presenting such beautiful offerings to the temple of Science'.¹¹⁸

Conclusion – The Creole Quandary

The position of creole savants was in many ways rather schizophrenic. On the one hand naturalists working on the imperial periphery craved the praise and acceptance of their European colleagues, and coveted the chance to participate in old-world scholarly circles, in even the most trivial manner. On the other hand, however, peripheral scholars staked their scientific authority on foundations that implicitly challenged the credibility of travellers and sedentary savants. They resented misrepresentations of their homeland. They marshalled local species that even Linnaeus would have struggled to classify (see Fig.20 and Fig.21 below), and they insisted that their own ingenuity, coupled with the staggering natural riches of America, permitted the creation of a form of science that was not merely imitative, but that boasted some distinctive features of its own.

¹¹⁸ Enrile, Mutis, *Flora*, Vol. I, p.132



Fig.20: Omeca Machacuai, Trujillo del Perú, Vol VI, Plate 60



Fig.21: Chachapas, Trujillo del Perú, Vol VI, Plate 27

Few individuals embody this quandary better than Caldas, whose letters to Humboldt and Mutis veered between pitiful expressions of self-worthlessness and

spirited defences of the quality and originality of his work. Sometimes the New Granadan wallowed in his misfortunes, expressing his surprise and delight that such eminent naturalists should condescend to communicate with him. On other occasions, however, he exposed the flaws and limitations in the Europeans' projects, contrasting the Europeans' whistle-stop tour of America with his own meticulous research projects.

Writing to Mutis in 1801, Caldas evidenced the first sentiment. The American prostrated himself before the Spanish botanist. He reverently enumerated the Spaniard's achievements and he juxtaposed Mutis' celebrity and enlightenment with his own anonymity and isolation. 'What a contrast there is between the two of us!' exclaimed Caldas melodramatically. 'You wise, known throughout Europe, praised in the North by the worthy son of Linnaeus, appreciated by the Nation [Spain] and enjoying the confidence of our august Sovereign, chief of a brilliant expedition whose precious fruits the scholarly world awaits with impatience; I ignorant, unknown by my own countrymen, living an obscure and sometimes impoverished life in a corner of America, without books, without instruments, without the means of learning and without being able to serve my Patria [New Granada] in any way'.¹¹⁹

Assessing Mutis' accomplishments after his death in 1808, however, Caldas offered a rather more critical assessment. The creole, upset by Mutis' failure to accord him the recognition he believed he deserved, strove to dissociate his own work from the unfinished botanical studies of his deceased mentor. He expressed his disappointment that many of the Spaniard's botanical drawings remained disordered, incomplete, or unaccompanied by accurate descriptions, and he moved swiftly to take credit for the idea of mapping the geographical distribution of New Granada's flora, a

¹¹⁹ Letter from Caldas to Mutis, 5 August 1801, in Chenu, *Caldas*, p.121

project which was, he insisted, entirely of his own invention. ‘Amongst the manuscripts of Mutis there must exist a *Memoir on the distribution of the plants that are cultivated in the vicinity of the equator*’, swaggered Caldas. ‘Neither Mutis nor all of his dependents can deny that I did not learn this general and philosophical way of looking at vegetation in his house, where no-one has ever thought of leaving the common and well-trodden path’.¹²⁰ The creole thus paraded his own innovation, inspired by the unique geography of his homeland, whilst tacitly censuring the intellectual conservatism of the Spanish savant.

¹²⁰ Letter from Caldas to the Secretario del Virreinato y Juez Comisionado para los Asuntos de la Expedición Botánica de Santafé, 30 September 1808, in Chenu, *Caldas*, p.219. Caldas evidenced a similar blend of self-deprecation and self-confidence in his relations with the botanist Aimé Bonpland. In his ‘Memoria sobre el origen del sistema de medir las montañas’, the creole conceded that ‘I know that my knowledge of this precious branch of natural history does not equal that of Bonpland’, but he went on to reflect that ‘it is impossible for this young botanist to see everything when he is going to disappear like a comet’. By contrast, he himself, ‘with constant labour’ would allow ‘nothing to escape [his] gaze’. See Francisco José de Caldas, ‘Memoria sobre el origen del sistema de medir las montañas y sobre el proyecto de una expedición científica’, in Caldas, *Obras Completas*, p.293

Chapter 6: Civilisation and Barbarism

On 31 December 1823 the Argentine Minister of Foreign Affairs Bernardino Rivadavia decreed the foundation of a public museum in the city of Buenos Aires. He designated the old convent of Santo Domingo as the site for the new institution. He appointed the Italian physicist Pedro Carta Molina to serve as its first director, and he assembled 'a lovely collection of physics instruments and a chemical laboratory', to stimulate scientific activity amongst his compatriots.¹

Outlining the function of the proposed museum, Rivadavia stipulated that its purpose was 'to offer the sons of the Argentine fatherland a scientific establishment of public instruction, to facilitate the study of the natural productions of the country and to create a repository for the historical and artistic objects that relate to [Argentina's] events, or to the famous men born on its soil'.² The Minister charged the Academy of Medicine and the Exact Sciences with 'forming a demonstrative collection of the geology of the country, and another of the birds of the same'.³ He also contracted a batch of European savants to instruct Argentine youth in the sciences 'for which good offices they were to receive handsome salaries and to live in a climate where people never die, and where peaches and beef were to be had for nothing'.⁴

In 1826, several years after Rivadavia enacted these progressive measures, the British traveller J.A.B. Beaumont had the opportunity to survey the results. His assessment was not overly encouraging. Summarising his impressions in his

¹ Alcides d'Orbigny, *Viaje a la América Meridional*, Buenos Aires, Editorial Futuro, 1945, p.89

² *Ibid.*, p.89

³ *Decreto que ordena el establecimiento de un Museo de Ciencias Naturales, firmado por el ministro de Relaciones Exteriores y Gobierno, Bernardino Rivadavia*, Buenos Aires, 31 December 1823

⁴ J.A.B. Beaumont, *Travels in Buenos Ayres and the Adjacent Provinces of the Rio de la Plata, with observations intended for the use of persons who contemplate emigrating to that country or embarking capital in its affairs*, London, James Ridgeway, 1828, p.215

subsequent book, *Travels in Buenos Ayres and the Adjacent Provinces of the Rio de la Plata*, Beaumont intimated that Rivadavia's legion of foreign experts was growing increasingly mutinous. He remarked that 'I did not hear that any of the professors were successful in getting up classes, except the professor of mathematics, and he had four pupils'. He reported, moreover, that 'the dullness of the town, the indifference of the people to the professors' attainments and the smallness of the allotted salaries overwhelmed them with ennui', though he suspected that their disgruntlement was exacerbated by their being 'chiefly French and Italians, whose very existence was moulded for pleasure or display'.⁵

As for the fledgling museum, Beaumont revealed that it had got off to a decidedly shaky start. According to the Briton, when Carta disembarked in Buenos Aires and enquired as to the whereabouts of the institution he was to direct, he received the ominous reply that it currently possessed no permanent building. The Italian's spirits were briefly lifted by reports of a collection of natural history specimens formed in the locality. This treasure, however, eluded discovery for several days, and, when it finally materialised, occasioned only muted celebrations. 'The collection', scoffed Beaumont, 'consisted of the skins of birds and beasts, much damaged by ill usage and insects'. It boasted, among its many delights, 'parrots without heads, paroquettes without tails, other birds without heads or tails and the skins of several wild beasts in a mutilated state' – hardly the hallmarks of scientific excellence – and it fell well short of Rivadavia's grandiose projections.⁶ Like so much else in the so-called 'Happy Experience' of the 1820s, the Minister's scientific

⁵ Ibid., p.215

⁶ Ibid., p.216

schemes seemed to have foundered on the depressingly familiar rocks of popular apathy, governmental insolvency and political instability.⁷

This chapter explores the development of natural history in Spanish America after independence. In the previous chapter, we saw how the creoles' location on the imperial periphery influenced their scientific research. This chapter inverts the focus to examine how the role played by science in the construction of nations and national identities.

The first part of the chapter considers why politicians like Rivadavia promoted the sciences in the years following independence. It suggests that they associated scientific excellence with modernity and civilisation and it assesses how political independence impacted upon the study of natural history in Spanish America. Was independence a watershed for scientific development, as some commentators presented it, or did problems persist in the acquisition of books, instruments and other scholarly materials? Were contemporaries justified in conflating political autonomy with scientific revival, or is Mauricio Nieto correct to argue that 'the end of empire was not the end of imperialism, but its continuation by different and more diffuse means'?⁸

⁷ 'La feliz experiencia' or 'La admirable experiencia' are terms that Argentine historians have deployed to describe the reforms enacted in the 1820s under the governments of Martín Rodríguez and his Minister and successor, Bernardino Rivadavia. Rivadavia, the motor behind most of these measures, was anxious to introduce European culture into Buenos Aires. He supplemented the scientific measures discussed here with other cultural initiatives, including the importation of European literature and a theatre troupe from the Old World, but his reforms proved to be somewhat ephemeral, the majority evaporating following his resignation in 1827. Rivadavia's progressive programme appealed to the porteño elite, who remembered it fondly as a heady spell of achievement sandwiched between the anarchy of the independence era and the cultural stagnation of the Rosas dictatorship. Nicolas Shumway, suggests, however, that the Minister's reforms were ahead of their time. He also detects early on in Rivadavia's career 'a strong anti-popular bias, as well as a weakness for decrees formulated only in consultation with his own private principles' – attitudes that doomed his policies to failure. See Nicolas Shumway, *The Invention of Argentina*, Berkeley, University of California Press, 1991, pp.81-111

⁸ Nieto Olarte, *Remedios para el Imperio*, p.242

The second half of the chapter focuses on the relationship between natural history and national identity. Continuing the discussion of creole patriotism initiated in the previous chapter, it examines how the study of local nature could help to forge a sense of nationhood in Spain's former colonies. It suggests that post-independence governments advocated the inventory of natural resources in order to assess their economic potential. It also contends that natural history could supplement or replace human chronicles and artefacts in the construction of a shared national past. David Brading and Rebecca Earle have shown how creole patriots before and after independence mobilised their indigenous 'ancestors' to create a distinctive, non-Hispanic national heritage, appropriating the past glories of the Incas and the Aztecs. The chapter argues that natural history functioned as a substitute for archaeology in countries that lacked a suitably grandiose Amerindian past. It concentrates particularly on Argentina, where the bones of enormous extinct mammals compensated in part for the lack of impressive Indian monuments.

Giants in Body and Mind

The years following independence witnessed a flurry of scientific activity in Spanish America. Eager to advertise their modernity and sophistication and to catalogue the natural resources of their respective countries, the new national governments patronised scientific projects. They reformed university curricula to prioritise scientific studies and they founded national museums of natural history. The Museo Público de Buenos Aires, first touted in 1812, was inaugurated in 1823. The Museo de Chile was founded in 1822 and natural history museums were also established in

Bogotá (1823), Mexico City (1825), Lima (1826) and Montevideo (1837).⁹ In Colombia, the national Congress proposed that a wide range of scientific disciplines be taught at the museum, including ‘mineralogy and geology, general and applied chemistry, botany, mathematics, physics, astronomy, agriculture, zoology, comparative anatomy, entomology [the study of insects], conchology [the study of shells] and drawing’.¹⁰ In Argentina, the Academy of Medicine detailed a similarly comprehensive research agenda for its members in a bid to improve the health of the population and the Academy’s secretary Juan Fernandez outlined a fifteen-point plan of action in 1823. Fernández exhorted his compatriots, amongst other things, ‘to determine the situation of Buenos Aires, its atmosphere, climate and variations...to describe the diseases common to the country...to present observations on our public hygiene...to collect works for the formation of an Argentine Flora...[and] to present a framework for a pharmaceutical code for the country’.¹¹

In order to staff these nascent museums and universities, post-colonial governments imported European experts. This was necessary in countries such as Colombia and Mexico, where many creole savants had perished during the wars of independence. It also signified a broader effort to forge direct cultural and economic relations with northern Europe and to bypass Spain, the former colonial power. It was hoped that the foreign scientists who signed contracts with South American regimes would impart their knowledge to the younger generation of creoles and thereby foster a tradition of scientific enquiry in the ex-colonies. They would equally have the

⁹ Maria Margaret Lopes and Irina Podgorny, ‘The Shaping of Latin American Museums of Natural History, 1850-1890’, *Osiris*, 2nd Series, Vol.15, 2000, p.109

¹⁰ Frank Safford, *The Ideal of the Practical*, Austin, University of Texas Press, 1976, p.102

¹¹ *Discurso leído a la Academia de Medicina de Buenos Aires a la apertura de las sesiones del año 1823, el 19 de abril del mismo, por su secretario Dr. Juan Antonio Fernandez*, Buenos Aires, 1823

opportunity to study the continent's natural phenomena, a prospect that lured many to offer their services to post-independence governments.

One individual who enthusiastically espoused the recruitment of foreign professors was the Argentine Bernardino Rivadavia. Posted in Europe in the 1810s as a diplomatic representative, Rivadavia scouted the continent for scientific personnel and he subsequently exploited his contacts to enlist suitable candidates. The French naturalist Alcide d'Orbigny reported that 'Rivadavia wanted to make the sciences flourish in Buenos Aires; to that effect he had procured, via repeated requests, a lovely collection of physics instruments and a chemical laboratory, and he had made come from Italy and France educated men, who would teach the different branches of science'.¹² Amongst the savants to acquiesce to the Minister's petitions was the French botanist and physician Aimé Bonpland, who was appointed as chair of medicine at the University.¹³ Another recruit, the Italian Pedro Carta Molina, was contracted to supervise the natural history museum. Carta was accompanied by his compatriot and successor in that role, Carlos Ferraris.

Other South American governments were equally keen to attract European scientists. This is illustrated by the case of the French chemist, Jean-Baptiste Boussingault. Whilst in Paris in 1822, Boussingault was courted by various new world countries. The Frenchman toyed with applying his skills to mining enterprises

¹² D'Orbigny, *Viaje*, p.89

¹³ Bonpland had previously flirted with the idea of going to Colombia, at the request of Simón Bolívar. The Liberator himself stated that 'I am the cause of his coming to America, since it was I who invited him to establish himself in Colombia; he had already decided to undertake this voyage when the circumstances of war [in Colombia] directed him instead to Buenos Aires'. Bonpland's biographer, Daniel O'Leary, substantiated this claim. He reported that 'the aimable character of the famous naturalist, and the interest that he showed in the fate of America, awoke in the spirit of Bolívar the strongest sympathy, and anxious to serve simultaneously both his friend and Venezuela, he offered him half of his estate, on condition that he establish himself in Caracas'. See Letter from Bolívar to Dr. José Gaspar Rodríguez de Francia, 23 October 1823 in Nicolas Hossard, *Aimé Bonpland*, Paris, L'Harmattan, 2001, p.180, and Daniel O'Leary, *Memorias*, Bogotá, Biblioteca de Autores Colombianos, Vol. I, p.19.

in Chile and Guatemala,¹⁴ before finally accepting Antonio Zea's invitation to teach chemistry in Colombia, where he was joined by his compatriot François Desiré Roulin, employed to teach physiology and comparative anatomy at the natural history museum, and two biological technicians, Jacques Bourdon and Justine-Marie Goudot.¹⁵ In his memoirs, Boussingault explained that Zea had recruited the Peruvian Mariano Rivero, then a student at the school of mines in Paris, to approach potential appointees. He also summarised both the terms of his contract, and his reasons for accepting. 'I was offered seven thousand francs for a salary, a grade in the engineers corresponding to this salary and my passage [to Colombia] aboard a warship' reminisced Boussingault, and 'I had to agree to an engagement of four years'. 'There were active volcanoes in the Andes; I knew no other volcanoes than the extinct ones of the Auvergne; I did not hesitate to undertake the adventure'.¹⁶

Post-independence regimes embraced the sciences partly for pragmatic reasons. They imagined their infant states to be bursting with undiscovered plants, animals and – most particularly – precious minerals, and they perceived natural history as the key with which to unlock these valuable resources. José de Urcullu, author of a natural history primer for the Spanish American market, fantasised about the exciting discoveries that awaited his readers, hoping that his book would 'stimulate the Young Americans to make, with time, new discoveries in that vast and little studied continent, where nature offers the wise naturalist at every step objects worthy of his attention in order to guide him perhaps to useful results still unknown to

¹⁴ Letter from M. Gueyniveau to Jean-Baptiste Boussingault, 1 February 1822, in Jean-Baptiste Boussingault, *Mémoires*, Vol. I (1802-1822), Paris, Typographie Chameret et Renouard, 1892, pp.267-268

¹⁵ Safford, *The Ideal of the Practical*, p.102

¹⁶ Boussingault, *Mémoires*, pp.167-168

the human race'.¹⁷ The Venezuelan savant Andrés Bello likewise addressed the economic benefits of the natural sciences in a speech delivered at the opening of the University of Chile (1843). 'Shall I enumerate the applications of those sciences to a land crisscrossed by veins of metal, a soil fertile in vegetable wealth and foodstuffs, a soil on which science has scarcely bestowed a passing glance?' asked Bello enthusiastically.¹⁸

In addition to recognising the practical advantages to be derived from natural history, post-colonial elites appreciated the cultural value of museums and universities. They equated science explicitly with civilisation. They modelled their new institutions on those of northern Europe and North America, and they courted the approval of old-world observers. Reviewing Rivadavia's entire cultural project, Nicolas Shumway discerns a conscious attempt to Europeanise Argentina, and to transform Buenos Aires into 'a showplace of Western Civilisation, an exemplum of European culture in the Americas, Paris in the Pampas'.¹⁹ Frank Safford observes how 'Bogotá's science instruction was to approximate, insofar as possible, that of France',²⁰ whilst Irina Podgorny and Margaret Lopes perceive New World natural history museums as 'a standard measure by which to test the scientific culture of a country, and [by extension] symbols of national identity'.²¹

Contemporary commentators likewise cast the years following independence as a time of feverish intellectual activity, as the political elite of the newly liberated

¹⁷ José Urcullu, *Catecismo de Historia Natural*, London, R. Ackermann, 1824, pp.vi-vii

¹⁸ Andrés Bello, 'Address delivered at the inauguration of the University of Chile, 17 September, 1843', in Iván Jaksic (ed.) *Selected Writings of Andrés Bello*, Oxford University Press, Oxford, 1997

¹⁹ Shumway, *The Invention of Argentina*, pp.83-84

²⁰ Safford, *The Ideal of the Practical*, p.102

²¹ Lopes and Podgorny, 'The Shaping of Latin American Museums of Natural History' p.110

provinces embraced European culture and fashions. D'Orbigny related his astonishment at finding newly imported pianos in the remote settlement of Carmen de Patagones, when he passed through the town in 1826.²² D'Orbigny's compatriot Jean Baptiste de Boussingault described, with similar incredulity, how Colombian women rapidly adopted the corset, having seen it modelled by Roulin's wife,²³ whilst the Argentine chronicler Vicente López characterised the 1820s as a period in which 'progressive proposals flourished in Buenos Aires with a rare animation' and the population 'sought with juvenile avidity the delights of the arts, of the letters, of poetry and above all of music'.²⁴ López included a passion for natural history in this raft of reforms, describing how the French naturalist Bonpland mesmerised the men and women at Tomás Luca's salon, and he recalled fondly how the botanist would entertain his attentive audience with lectures on plants collected in the vicinity. 'Mr Bonpland, with his blue tailcoat, his white cravat and his yellow waistcoat, after having deposited his umbrella in a corner, often next to the sword of San Martín, used to enter with his air of angelical goodness and was immediately surrounded [by those present] as the celebrated interpreter of the beauties of our natural history', rhapsodised López.

Every night he enchanted his listeners, speaking to them of some new herb, of some new useful or charming plant that he had discovered in his explorations that morning; and this pleasant lesson was followed on occasion by a discussion of recreational physics, with experiments and demonstrations that

²² D'Orbigny, *Viaje*, p.902

²³ Jean Baptiste Boussingault, *Mémoires*, Paris, Typographie Chamercet et Renouard, 1892, Vol. III, pp.91-92

²⁴ Vicente F. López, *Historia de la República Argentina: su origen, su revolución y su desarrollo político hasta 1852*, Buenos Aires, Imprenta de Mayo, 1890, Vol. IX, p.9

another savant, Mr. Dossier graciously performed in response to the demands that were made of him.²⁵

López's juxtaposition of Bonpland's umbrella and San Martín's sword was perhaps significant, since these objects and their illustrious owners symbolised both the military muscle and the intellectual vigour of the fledgling American republics. López evidently wished to show that his native Argentina possessed scholarly ardour as well as martial valour. He extolled simultaneously the courageous feats of the warrior and the delicate, instructive and morally invigorating labours of the naturalist presenting the latter as a delightful, saintly figure exuding charm, and 'angelical goodness'.

Another American writer, the Uruguayan naturalist and clergyman Dámaso Antonio Larrañaga, articulated similar sentiments in 1816, when he delivered the inaugural oration for Montevideo's newly founded public library. In this oration, Larrañaga expressed the hope that the 18th May, traditionally celebrated as the anniversary of José Gervasio Artigas' victory at the battle of Las Piedras, would henceforth be remembered also as the birth of Uruguay's first scholarly institution.²⁶ He enjoined his compatriots to imitate or even surpass the achievements of their North American neighbours, proving to the 'literary world' that 'in the most southerly regions of South America one finds not merely the only true giants in body [the Patagonians], but also in mind and spirit',²⁷ and he explicitly savoured the impression that the public library would make on European observers, employing the rhetoric of

²⁵ Ibid., pp.30-31

²⁶ Larrañaga, 'Biblioteca de Montevideo, Oración Inaugural', in Gallinal, Vol. III p.137

²⁷ Ibid., p.145

'civilisation' and 'barbarism' later popularised by his compatriot Domingo Faustino Sarmiento:

When the savants of the old continent hear it said that in the most remote towns of South America, in which less than a century ago there was not the least vestige of civilisation, and whose inhabitants exhibited such barbarous customs that their sole diversion consisted on chasing after wild beasts, that amidst the ruin and desolation of civil wars, that public libraries are opened and that [their foundation] is celebrated with public festivals, what high ideas do you not imagine they will conceive of inhabitants with such excellent principles?²⁸

Civilisation and Barbarism

Independence also occasioned a re-evaluation of Spanish science and its implications for America. Late colonial savants, as we have seen, generally perceived themselves as participating in a broader Hispanic scientific project orchestrated by the Spanish crown. Post-independence writers, by contrast, usually conceived of natural history in overtly national terms. They minimised the former metropolis' contribution to natural knowledge and they construed their newly-won autonomy as a watershed not only for political change, but also for scientific and cultural regeneration. In the process, they perpetuated the pitiful image of the beleaguered colonial savant, abandoned or even persecuted by the authorities that should have protected him and accomplishing amazing feats by dint purely of his innate genius and perseverance.

Typical of this stance was the Argentine poet Florencio Varela, who published the first Spanish translation of Azara's *Voyages dans l'Amérique Méridionale* in

²⁸ Ibid., p.140

1846. In his editor's preface, Varela questioned why this valuable work had not previously been disseminated in its author's native tongue. He vilified Argentina's former imperial masters for suppressing a potentially useful document, and he cast Azara in the familiar guise of embattled, under-appreciated Spanish savant. 'The book that we publish for the first time in Castilian is a strong charge against the administration of Spain in these provinces', lectured Varela.

Written originally in the language of our fathers, the literary and scientific worlds know it only in French; and they would not even know it in this form if its author, a man endowed with great powers of observation and clear reason, although not enriched with much acquired knowledge, had not been obliged, by poverty and the abandonment of the Government whom he had served with more utility than anyone else in America, to sell his manuscript to a bookseller in Paris.²⁹

Two other postcolonial writers, the Colombia Joaquín Acosta and the Argentine Domingo Faustino Sarmiento, painted a similar picture. Acosta, publishing a selection of Francisco José de Caldas' manuscripts in 1849, eagerly swallowed the colonial naturalist's self-representation as an enterprising autodidact, declaring admiringly that Caldas, 'without teachers, without books and without resources came, by his own efforts, to be a distinguished botanist, physicist and astronomer'. The Colombian condemned the 'barbarians' who had callously slaughtered this American 'genius' in 1816. He entreated his contemporaries to emulate Caldas' noble example and he pointedly juxtaposed the bountiful resources at their disposal with the deprivations that had afflicted the colonial savant. 'Young Granadinos, here you have the same nature that made your compatriot famous', enthused Acosta, 'and you have

²⁹ Azara, *Viajes*, Vol. I, p.1

in addition that which he lacked – books, methods, instruction and a liberal government that protects those who dedicate themselves to the sciences'.³⁰

The Argentine Sarmiento echoed these sentiments in 1886, when he compiled an anthology of the writings of the physician Francisco Javier Muñiz. Introducing a chapter on Muñiz's contribution to palaeontology, Sarmiento reflected reproachfully that 'we have lacked eyes for three hundred years or more to see the things that surround us in America, where our fathers came ill-equipped for the study of the new nature that presented itself to them with strange, grandiose and beautiful forms'. The Argentine, like Acosta, interpreted political independence as the catalyst for scientific development. He savoured the opportunities now on offer to naturalists in the continent, and he even massaged the historical chronology to claim Humboldt's celebrated expedition for the national era, deftly silencing the fact that it had occurred between 1799 and 1804, with the full support of the Spanish Crown. 'Finally, with America opened by the independence of the former colonies to all investigations, and exposed to all gazes, Humboldt, the greatest savant of modern times, traversing it, discovered an old world in the New World', rhapsodised Sarmiento. This cathartic experience 'induced him to write the *Cosmos*, the history of the creation of the universe, which is today believed to be the gospel of a new theory or idea of existence that has yet to reveal all of its moral, political and philosophical consequences'.³¹

As these comments suggest, Varela, Acosta and Sarmiento offered a very upbeat assessment of post-independence science that presented the overthrow of Spanish rule as a major turning point for the scientific development of her American colonies. Whilst such optimism may have encapsulated the spirit of the times,

³⁰ Joaquín Acosta, 'Breve Noticia sobre Francisco José de Caldas', in *Semanario de la Nueva Granada, Miscelánea de Ciencias, Literatura, Artes e Industria*, Paris, Librería Castellana, 1849, pp.ix-x.

³¹ Domingo Faustino Sarmiento, *Vida y Escritos de Francisco Javier Muñiz*, Buenos Aires, 1901, p.198

however, independence was certainly not a panacea for all scientific ills. Naturalists working in the former Spanish colonies continued to experience material, financial and intellectual difficulties well into the nineteenth century. Indeed, it is arguable that political independence, far from accelerating the progress of the natural sciences, actually retarded it, since it curtailed existing projects, claimed the lives of established creole naturalists and cut others off from the support infrastructure that operated in the colonial era. Caldas, the zoologist Jorge Tadeo Lozano, the botanical painter Salvador Rizo and Humboldt's travelling companion Carlos Montúfar all perished in the independence struggle, whilst Antonio Zea and Hipólito Unanue got sucked into political careers.³² Thomas Glick duly suggests that, 'in retrospect, the desirability of breaking the bonds of dependence with Europe was a chimera, because the networks of scientific communication that had been established, however imperfectly, in late colonial times could not be replaced'.³³

The Briton Frances Calderón de la Barca, espoused this more pessimistic interpretation of post-independence science in the early 1840s, when she visited Mexico as wife of the Spanish ambassador to that country. Touring the botanical garden in Mexico City, Calderón conjured a sorrowful picture of dilapidated institutions and impoverished personnel. She described with affection the current gardener, 'an old Italian, who came over with one of the viceroys, and though now one hundred and ten years old, and nearly bent double, possesses all his faculties', but she regretted that the garden, though 'pretty from the age of the trees and luxuriance

³² Zea played an important role in the government of newly independent Colombia. Unanue was, according to British General William Miller, an important figure in the post-independence politics of his country, since 'his flexibility always kept him amongst the rulers of the day'. See Miller, *Memoirs*, Vol. II, p.339

³³ Thomas Glick, 'Science and Independence in Latin America (with special reference to New Granada)', *Hispanic American Historical Review* 71:2, Duke University Press, 1991, p.334

of the flowers' was 'melancholy as proof of the decay of science in Mexico'. Calderón explicitly contrasted this pale shadow of a garden with the former grandeur of the institution in colonial times, when 'courses of botanical lectures were...annually given by the most learned professors and the taste for natural history was universal', and she interpreted independence as the onset of decline, not regeneration. 'The Botanic Garden...is a small, ill-kept enclosure, where there still remain some rare plants of the immense collection made in the time of the Spanish government, when great progress was made in all the natural sciences, four hundred dollars having been expended in botanical expeditions alone' sighed Calderón. The current incarnation, on the other hand, constituted one of many 'sad proofs, if any were wanting, of the melancholy effects produced by years of civil war and unsettled government'.³⁴

An equally poignant commentary on the decline of Spanish scientific institutions after independence emerges from the memoirs of the chemist Boussingault. Before his arrival in New Granada, Boussingault had heard of the work of the Spanish botanist, Mutis, and he wished, whilst in Bogotá, to view the Spaniard's extensive herbarium and his astronomical observatory. What he discovered there, however, shocked and depressed him. Entering Mutis' old house, Boussingault found the building in a state of disrepair, with a tree impaling its roof. The observatory was in similarly poor condition, patriot troops having been garrisoned within its walls during the independence struggle, and Boussingault painted a distressing scene of vandalism and devastation. 'In what a state were the instruments that had not been stolen!' exclaimed the Frenchman. 'The glasses of the eyepieces had been extracted, as well as those of the chronometers and telescopes [and] the pendulum [made by Graham] was entirely broken'. As for Mutis' famous collection

³⁴ Frances Calderón de la Barca, *Life in Mexico during a Residence in that Country*, New York, E.P. Dutton and Co., 1931, pp.125-128

of botanical drawings, they had been requisitioned by the Spanish general Pablo Morillo and whisked off to Europe. Boussingault initially interpreted this sequestration as a sad loss, yet on reflection he amended this verdict, concluding that the removal of the drawings, if a loss to New Granada, was most definitely a gain for science. 'This rich and inestimable collection is religiously preserved in the natural history museum of Madrid', reported Boussingault. 'If it had remained in Bogotá, it is more than likely that it would have been destroyed, or at least dispersed, and, in consequence, lost to science'. The dislocation of independence thus sabotaged existing scientific projects, compelling the new nations to start from scratch in the building of new institutions.³⁵

In all probability, neither this cataclysmic assessment of science in post-independence America, nor the unrealistically optimistic predictions of Acosta and Sarmiento is entirely accurate. To gain a better understanding of how independence impacted upon the lives of American naturalists it may be instructive to look at the testimony of savants themselves, and to see how they felt about the changing political conditions. Did creole scholars notice an alteration in their treatment and status? Were they better provisioned and better integrated into the scientific community than in colonial times, or did they encounter similar problems and impediments?

To begin to answer these questions we may look at the experiences of two naturalists from the Rio de la Plata region, the Uruguayan priest Dámaso Antonio Larrañaga (1771-1848) and the Argentine physician Francisco Javier Muñiz (1795-

³⁵ Boussingault, *Mémoires*, Vol. III, pp.108-113. The Spanish General Pascual Enrile corroborated Boussingault's contention that patriot troops vandalised much of the equipment in the Santa Fé observatory, though he was, of course, hardly an impartial observer. In a report to the Spanish Crown dated 14 March 1817, Enrile stated that 'the Observatory was destroyed when the rebel Bolívar entered, with only the pendulum and the luesa [?] remaining in a good state'. He also suspected the artist Salvador Rizo of having sequestered some of Mutis' botanical works, though was unable to prove this. See Mutis, *Flora*, Vol. I, p.132

1871), both of whom devoted their spare time to studying the natural history of their native lands. Larrañaga is particularly interesting because his interest in natural history spanned the colonial and national periods, putting him in a good position to judge whether conditions became more or less favourable for scholarly activity in the decades following independence. Muñiz's career, on the other hand, illustrates some of the problems that persisted into the postcolonial era. It also exhibits the continuing perception of American naturalists as isolated figures, cut off from the main centres of scientific study and reliant primarily upon their own initiative.

A glance at Larrañaga's correspondence with various European savants in the 1810s and 1820s suggests that independence improved the situation of the colonial naturalist, particularly regarding access to scientific texts. Writing to the botanical society of Barcelona in 1804, we may recall, the Uruguayan sighed plaintively that books in the Banda Oriental were 'very rare and expensive' commodities.³⁶ In a letter to the French savant Bonpland in 1818, however, Larrañaga was talking about 'the abundance of books' now at his disposal. He described his feelings of 'satisfaction' at 'seeing my ideas confirmed' and his relief upon discovering that 'I had not deceived myself in the judgement that I had formed of their novelty'.³⁷ He also listed with pride the impressive selection of texts that he had managed to procure for the newly founded public library in Montevideo, including works by 'Linnaeus...Buffon, the French Pliny...Tournefort, Jussieu, Bomate, Haily, Kirwan, Quer, Molina, Ruiz and Pavón, Ortega, Cavanilles, Azara and other famous interpreters of nature'.³⁸

³⁶ Draft of a letter from Dámaso Antonio Larrañaga to the botanists of Barcelona, to be delivered by a mutual acquaintance, Don Miguel Antonio Vilardebó, in Gallinal, Vol. III, p.252

³⁷ Letter from Larrañaga to Bonpland, 26 February 1818, Gallinal, *Escritos*, Vol. III, p.261

³⁸ Larrañaga, 'Biblioteca de Montevideo, Oración Inaugural', in Gallinal, *Escritos*, Vol. III, p.144

Larrañaga acquired his books from various sources. He received some from the European naturalists who descended on America in the aftermath of independence, notably Bonpland and the French botanist August de Saint-Hilaire; he purchased others in Rio de Janeiro, where he was sent on a diplomatic mission. The Uruguayan informed Bonpland in 1818 that 'I bought in [Rio de] Janeiro the large edition of Buffon, by Sonnini, Cuvier and other famous zoologists', whilst 'Dr. Chapús has had the goodness to supply me with the second edition of the Dictionary of Natural History, which extends to fifteen volumes'.³⁹ He went on to request several works from the Frenchman, including Humboldt's *Tableau de la Nature*, Schel's *Dictionnaire des Sciences Naturelles* and Plumier's *Plantae Americanae*,⁴⁰ and he surmised that, equipped with these texts, he was 'up to date with the majority of the most recent discoveries' in the field of natural history.⁴¹

Larrañaga also benefited from direct encounters with European savants who could advise and direct him in his studies. He contrasted his intellectual solitude in the final years of the colonial period with the greater scholarly companionship available to him after independence. He cherished the opportunity to act as an honorary member of a Parisian scientific society – 'what greater reward can an American hope for?' - and he construed his first meeting with Saint-Hilaire as a moment of scientific revelation. 'So great was my distress at being reliant upon myself for such a long period of my life, seeing myself deprived of Masters to teach me, or with whom I

³⁹ Letter from Larrañaga to Bonpland, 25 May 1818, Gallinal, *Escritos*, Vol. III, p.268

⁴⁰ Bonpland supplied Larrañaga with the zoological and astronomical sections of his voyage with Humboldt, Humboldt's *Tableaux de la Nature*, Schel's *Dictionnaire des Sciences Naturelles*, Desfontaines' *Tableaux de l'Ecole Botanique*, Plumier's *Plantae Americanae* and Raynal's *Histoire Philosophique*. Saint-Hilaire sent the American two pieces of his own work, whilst the Prussian naturalist Fray Sellow furnished him in 1827 with copies of a work by Wilhelm von Humboldt concerning the study of American languages, a topic about which Larrañaga expressed an interest.

⁴¹ Letter from Larrañaga to Bonpland, 25 May 1818, Gallinal, *Escritos*, Vol. III, p.268

could consult my doubts, that my pleasure upon seeing enter my door a savant of the first order, who in a moment dissipated by fears, clarified my ideas and corrected my errors was all the greater', stuttered Larrañaga, apparently confirming Sarmiento's and Acosta's contention that independence facilitated the study of nature.⁴²

If Larrañaga's experience of independence was overall a positive one, however, then political change still did not solve all of his scientific problems. The Uruguayan reported on a number of occasions how his increased diplomatic obligations in the 1810s distracted him from his research, with the result that 'I certainly do not achieve in a month that which would once have taken me a single day'.⁴³ Larrañaga continued to doubt the quality of his work, fearing a harsh reception from a European audience, and his correspondence also suggests that the acquisition of scientific literature, though easier than it had once been, was still not without its difficulties.

This last point is illustrated by a letter to Larrañaga from the French naval officer Louis Charles de Freycinet, whom the Uruguayan encountered in 1817 during the latter's circumnavigation of the globe. Larrañaga had charged Freycinet with purchasing a number of books for him upon his return to Paris, including the remaining volumes of Deterville's *Dictionnaire de Histoire Naturelle*. The Frenchman, however, found the Parisian bookseller reluctant

to cede you the volumes that you were missing, his motives being that you were not on his list of subscribers; that it was not to you that the first volumes had been sold; that probably you had got them via another bookseller, who had

⁴² Letter from Dámaso Antonio Larrañaga to Auguste Sainte-Hilaire, 16 February 1821, in Gallinal, , Vol. III p.279. Larrañaga characterises his meeting with Saint-Hilaire as a moment of intellectual epiphany. His language mirrors that employed by Caldas to describe his encounter with Humboldt and Bonpland in 1802.

⁴³ Letter from Larrañaga to Bonpland, 25 May 1818, Vol. III, p.268

already come, or would come soon, to collect the rest of the work; that in dispensing to you the volumes that you lacked he would be obliged to spoil a set, etc., etc.⁴⁴

Freycinet remonstrated with the recalcitrant bookseller and ultimately persuaded him to part with the work Larrañaga coveted. The complexities of the transaction, and the objections voiced by the bookseller illuminate, nevertheless, the additional hurdles that peripheral savants had to clear in order to secure the books they needed, suggesting that creole naturalists remained at a distinct bibliographic disadvantage when compared to their European counterparts.

The case of Muñiz (1795-1871) offers a rather gloomier picture of scientific opportunities in post-independence Spanish America. The Argentine physician, whose true passion was palaeontology, executed his studies, according to Alberto Onna, in a climate of 'relative material poverty and total cultural poverty, without referents with which to share his finds and his doubts and with scarce specialised bibliographic information (only some works by Cuvier, Lamarck and Linnaeus)'.⁴⁵ He subsisted on a limited range of books and equipment and, though in contact with several European naturalists, including the French comparative anatomist Geoffroy Saint-Hilaire and

⁴⁴ Letter from Freycinet to Larrañaga, 29 March 1829, Gallinal, *Escritos*, Vol. III, p.287

⁴⁵ Alberto F. Onna, 'Estrategias de Visualización y Legitimación de los Primeros Palacontólogos en el Río de la Plata durante la Primera Mitad del Siglo XIX: Francisco Javier Muñiz y Teodoro Miguel Vilardebó', in *La Ciencia en la Argentina entre Siglos*, Marcclo Monserrat (ed.), Buenos Aires, Manantial, p.62. Problems in obtaining instruments also persisted. The North American traveller, John Lloyd Stephens, for example, broke his barometer on the way to Guatemala City and grumbled that 'It was impossible to repair it in Guatemala...a source of regret during our whole journey, for we ascended many mountains, the heights of which have never been ascertained'. The Bavarian naturalists Johann von Spix and Carl Friedrich von Martius likewise suffered the loss of a barometer, following a difference of opinion with a mule. They also experienced difficulties in replacing, since 'the natural sciences have hitherto met with little encouragement, even in the principle cities of Brazil', and 'the barometers which are here and there met with are accordingly considered as invaluable by the few persons who amuse themselves with meteorological observations'. See Frederick Catherwood, *Incidents of Travel in Central America, Chiapas and Yucatán by the late John Lloyd Stephens*, London, Arthur Hall, Virtue and Co., 1854, p.25; and Johann Baptista von Spix and Carl Friedrich von Martius, *Travels in Brazil in the Years 1817-1820. Undertaken by command of His Majesty the King of Bavaria*, London, 1824, Vol. I, pp.281-282

the Briton Charles Darwin, he persistently professed doubts as to the precision of his research and the adequacy of his training. 'Lacking schools in which to study the different organisation of animals, and in which to acquire instruction in comparative anatomy, I am far from able to trace an enlightened and useful description of the skeletons or fossil bones that I find', Muñiz whimpered self-effacingly, lamenting his situation 'two thousand leagues from the centre of civilisation...without stimulus, without guidance and even without the theoretical knowledge communicated by good authors'.⁴⁶

This sorry state of affairs elicited the same exclamations of surprise and admiration that had greeted colonial savants such as Caldas and Azara, and it triggered similarly scathing comments about barbarous governments and ignorant accomplices. The Prussian-born director of the Museo Público de Buenos Aires, Germán Burmeister, for example, regretted that the skulls of two prehistoric horses excavated by Muñiz had been damaged because, 'owing to the immense labour of extracting these two entire skeletons from the earth rapidly, without the assistance of useful helpers, the able discoverer was obliged to work without the necessary care, breaking the two craniums'.⁴⁷ Darwin, meanwhile, writing to Muñiz in 1847, declared that 'I cannot adequately express how much I admire your continued zeal, situated as you are without the means of pursuing your scientific studies and without anyone who

⁴⁶ Sarmiento, *Muñiz*, p.205

⁴⁷ *Ibid.*, p.203. Burmeister himself documented similar, if less extreme, technical problems as late as the 1870s, when he apologised in the prologue to the 1874 edition of the *Anales del Museo Público de Buenos Aires* for the delay in publishing a monograph of the glyptodon fossils found in Argentina. The Prussian attributed the tardiness of the article's appearance to 'the necessity of sending the drawings for the plates to Europe, so that they can be executed with precision and elegance'. He explained that this procedure was necessary, for whilst 'Buenos Aires does not lack printing houses that work quite well...the artists in these establishments are not accustomed to scientific works, and for this reason their creations do not have the necessary perfection'. See Germán Burmeister, *Anales del Museo Público de Buenos Aires*, 1874, Vol. II, Preface.

sympathises with you in the progress of Natural History'.⁴⁸ The Briton offered a similarly laudatory evaluation of the Argentine's achievements in a letter to the comparative anatomist Richard Owen, commenting that 'it is really very remarkable considering this man's utterly isolated position, and that he must be poor, being a medical practitioner in the village of Luján, that he keeps his zeal up',⁴⁹ and he urged Owen to publish some of Muñiz's material in a British scientific journal, since 'a S. American osteologist is a prodigy in nature' and publication might encourage the Argentine to send further specimens to London.⁵⁰ Muñiz's continued isolation and lack of trained assistants recalls the incessant complaints of Caldas and his contemporaries. It suggests that independence did not dramatically improve the position of the Spanish American savant, who continued to suffer from an acute lack of instruction and resources.

Some of these problems affected European savants, too. Financial constraints meant that their salaries went unpaid. Persistent political unrest thwarted their projects whilst museums and universities declined as early enthusiasm abated and pupils failed to materialise. In Colombia, François Desiré Roulin, forced to supplement his miserly remittance by practicing medicine and portrait painting, was reduced to roaming the streets of Bogotá dressed in a coat made from an old floral curtain – a severe affront to his scholarly dignity.⁵¹ In Mexico, 'such were the exigencies of the state that even the trifling salary of the venerable little Italian curator [of the botanical garden] was

⁴⁸ Ibid., p.207

⁴⁹ Letter from Charles Darwin to Richard Owen, 12 February 1847, <http://www.darwinproject.ac.uk>

⁵⁰ Letter from Darwin to Owen, 1846 (precise date unknown), <http://www.darwinproject.ac.uk>. Darwin feared that it would not be possible to publish Muñiz's paper in a British journal, owing to 'the loose manner in which it appears to me drawn up, & from the Translator not being an anatomist'. This assessment further underlines the Argentine's isolation from the scientific community and is reminiscent of Azara's stylistic *faux pas* at the turn of the nineteenth century.

⁵¹ Safford, *The Ideal of the Practical*, p.103

unpaid', whilst the Frenchman Mr. Brossard, visiting the Buenos Aires Museum in 1847, delivered a less than encouraging verdict on its contents and upkeep.⁵² 'The Museum...is composed on a Cabinet of Natural History, the pieces of which are deteriorating through lack of care', reported Brossard. It also boasted 'a collection of medals covered in dust and some objects with which General Rosas has enriched it, and to which he attaches great importance because they have been donated, or because they relate to the history of his government'.⁵³

Such adverse conditions necessarily generated frustration and despair on the part of European naturalists, who rapidly began to desert their posts. The French botanist Bonpland, for example, expressed his disappointment at the persistent political unrest in the Argentine provinces, which had forced him to abandon his most cherished schemes, and he complained to his correspondent Larrañaga about the circumstances that had put his teaching duties on hold. 'I had bought here a herbarium of more than two thousand plants, well classified, a precious collection of shells and a very interesting mineralogical collection containing the mineralogy of my voyage with Humboldt and all that I have procured in that genre since my return to France until the time of my departure [for Buenos Aires]', muttered Bonpland. But 'I had created for myself a sweet illusion; I believed that these collections, precious for their selection and the manner in which they objects are ordered, would serve as a sort of base for an establishment of public instruction, and I see with pain that in the state of

⁵² William Bullock, *Six Months' Residence and Travels in Mexico; containing remarks on the present state of New Spain, its Natural Productions, State of Society, Manufactures, Trade, Agriculture and Antiquities, with Plates and Maps*, London, John Murray, 1824, p.185

⁵³ Ricardo Manuel Trelles, *Memoria presentada a la Asociación de Amigos de la Historia natural del Plata sobre el estado del Museo y demás relativo a la institución*, Buenos Aires, Imprenta de 'El Orden', 1856, p.5. Among the treasures that Rosas donated to the Museum was the 'infernal machine' with which his enemies had attempted to assassinate him. See Germán Burmeister, 'Sumario sobre la Fundación y los Progresos del Musco Público de Buenos Aires' in *Anales del Museo Público de Buenos Aires para dar a conocer los objetos de Historia Natural nuevos o poco conocidos conservados en este establecimiento*, Buenos Aires, Imprenta de la Tribuna, 1864, Vol. I, p.6

continual war one is forced to forget the sciences'.⁵⁴ Bonpland's exquisite collections thus remained in their boxes in 1818, some two years after he disembarked in Argentina, and he grumbled to Larrañaga that 'the unfortunate political state of your country has thwarted and suspended all of my projects'.⁵⁵

If political unrest and governmental insolvency were to a large extent to blame for the failure of post-independence scientific enterprises, however, then the mentality of the European experts themselves was perhaps in some ways equally culpable. Enticed to America by the promise of generous salaries, many savants were ultimately less concerned with fostering scientific development amongst creole youths than with enhancing their own career prospects. They viewed their stint in the new republics as an excellent chance to study their little known natural phenomena, and they hoped to return to Europe with impressive collections and a higher scientific status than when they had left it.

Frank Safford contends in the case of Colombia that 'Boussingault and Roulin had never looked upon their venture to the New World as more than an extended field trip', and had no wish to remain permanently in a place such as Bogotá that 'could offer neither the laboratory facilities available in Europe, nor the stimulus of a scientific community'.⁵⁶ Boussingault himself expressed this intention quite candidly, confessing that his primary reason for accepting Zea's invitation to Colombia was the possibility of studying 'the active volcanoes of the Andes'. The Frenchman relished the potential riches of the Magdalena river, where he and his fellow naturalists 'will have an infinity of things to collect, principally fish, absolutely unknown in the

⁵⁴ Letter from Bonpland to Larrañaga, 2 April 1818, in Gallinal, *Escritos* Vol. III, p.261

⁵⁵ Letter from Bonpland to Larrañaga, 15 September 1818, in Gallinal, *Escritos* Vol. III, p.270

⁵⁶ Safford, *The Ideal of the Practical*, p.103

cabinets of Europe',⁵⁷ and, in a letter to his parents, written immediately prior to the voyage, Boussingault prophesied that his sojourn in America would further his career back in France. 'You will see how much this voyage must make me smile', chortled the Frenchman. 'I cannot fail to succeed, and, upon my return to Europe, I hope to have some titles that could serve to help me place myself with some advantage'.⁵⁸

Other European savants evinced a similar attitude. Claudio Gay, appointed director of the Museo Nacional de Chile in 1830, returned to France in 1842 to compose his *Historia Física y Política de Chile*, taking with him a substantial part of the museum's collection.⁵⁹ Carlos Ferraris likewise departed Buenos Aires for his native Turin in 1836, armed with a selection of Argentine specimens,⁶⁰ whilst Bonpland, though he personally remained in America, devoted more time to his own botanical researches than to the instruction of Argentina's youth. The Frenchman remitted a raft of native specimens to the Musée d'Histoire Naturelle in Paris throughout his lifetime,⁶¹ and, following his death in 1858, Humboldt personally intervened to recover his collections, in conformity, so he claimed, with the wishes of the deceased. As the *Times* reported:

⁵⁷ Letter from Boussingault to his parents, 26 August 1822, in Boussingault, *Mémoires*, Vol. I, p.293

⁵⁸ *Ibid.*, p.292

⁵⁹ Patience Schell, 'In the Service of the Nation: Santiago's Museo Nacional', <http://www.bbk.ac.uk/ibamuseum/texts/Schell04.htm>, p.7

⁶⁰ <http://www.planetariogalilei.com.ar/ameghino/biografias/ferra.htm>

⁶¹ In a letter to Humboldt in 1832, Bonpland promised that 'the [Parisian] Jardin des Plantes will receive not only that which I have collected recently [in Paraguay], but also that which I have salvaged from my herbariums in Corrientes and Buenos Aires'. Later, writing to Michel Eugène Chevreul in 1837, Bonpland detailed yet more objects that he was remitting to the Musée d'Histoire Naturelle. He expressed the hope that these specimens would advance European science and anticipated that his two vizcacha skeletons would 'find a place ...in the rich cabinet of comparative anatomy, to which science owes the greatest part to M. Cuvier'. See Letter from Bonpland to Humboldt, 7 May 1832 in Hossard, *Bonpland*, p.185 and Letter from Bonpland to Chevreul, 5 January 1837, in Hamy, *Bonpland*, p.206

The last number of the *Compte Rendus* contains a letter from M. Alexander Von Humboldt to M. Elie de Beaumont, in which the illustrious writer, in expressing his regret at the death of Bonpland, which is now precisely known to have occurred on the 11th May last, earnestly requests the professors of the Jardin des Plantes to take immediate measures for entering into possession of the extensive horticus siccus left to that establishment by the deceased. In case Bonpland should not have left a will, M. Von Humboldt states that he has a letter of his, dated Corrientes, June 7, 1857, in which he distinctly states his intention on the subject; this letter M. Von Humboldt places at the disposal of the museum, if necessary for the assertion of its rights.⁶²

Bonpland's collections were thus destined to enrich the Parisian Jardin des Plantes, rather than the Museo Público de Buenos Aires.

Early scientific setbacks thus had a variety of causes. Contemporaries, however, often couched them in the more simplistic – and more emotive – language of civilisation and barbarism. They blamed the closure of stagnation of museums and universities on the nefarious machinations of uncultured caudillos, who withdrew their funding and neglected their upkeep, and they associated scientific failure with the negligence of ignorant warlords.⁶³ One unsurprising exponent of this rhetoric was the Argentine Sarmiento, who, reviewing Muñiz's career, related how the latter had assembled with great patience and expertise a collection of fossil bones. The naturalist had donated his cherished specimens to the Provincial Government in 1842, in the

⁶² *The Times*, Friday, Oct 01, 1858; pg. 7; Issue 23113; col A

⁶³ Jens Andermann argues, in the case of Argentina, that 'Natural history and the liberal nation...not only shared the same fate, they also mutually allegorised each other as manifestations of an order that was self-evident, and could only be contested from the position of a barbarian otherness'. See Jens Andermann, 'The Museo Natural de Ciencias Naturales, Buenos Aires', <http://www.bbk.ac.uk/ibamuseum/texts/Andermann05.htm>, p.7

hope that it would send his offering to Buenos Aires for exhibition in the Museo Público, but the authorities, insensible to their significance, were persuaded by the dictator Juan Manuel de Rosas to relinquish them to the French Admiral Dupotet, to the considerable distress of their original owner, an act which Sarmiento predictably interpreted this episode as glaring evidence of rosista barbarism. 'The Provincial Government', sneered the Argentine, 'was then occupied in preference with exterminating savage Unitarians, [and was] far from giving importance to these fossil bones, whose value and significance the public of the time did not understand'. Rosas, meanwhile, was personally implicated in the expatriation of Muñiz's precious discoveries, since 'he pressurised [the Provincial Government] to get rid of them', exposing in the process his culpable ignorance and ineptitude.⁶⁴

The Argentine dictator attracted similar charges for his management of the museum, with his two decades in power usually being presented as a reprehensible era of decay and neglect. The 1854 decree for the foundation of the Asociación Amigos de la Historia Natural del Plata committed its members to resurrecting the Museo from 'the mean state to which it has today seen itself reduced', commenting pointedly that it had sunk to such depths 'not though the negligence of its employees, but through the absolute abandonment in which it has found itself during the long domination of Rosas'.⁶⁵ The Prussian Hermán Burmeister, appointed to direct the institution in 1862, was equally scathing in his appraisal, and he chastised Rosas for the pathetically small number of donations made to the museum during his dictatorship. 'The donors do not exceed eight', snorted Burmeister, 'nor do the objects donated exceed sixty, excluding the trophies [of war donated by the dictator himself];

⁶⁴ Sarmiento, *Muñiz*, p.201

⁶⁵ *Decreto oficial de la creación de la Asociación Amigos de la Historia Natural del Plata, para el fomento del Museo de Historia Natural*, Buenos Aires, 6 May, 1854

and these, one may say, constitute the acquisitions that the establishment made during the long and evil dictatorship of ROSAS'.⁶⁶ Science thus acted as a barometer for civilisation, with scientific failure being blamed on the barbarism of both the former imperial regime and uncultivated American caudillos.

Bones of Contention

In his 1884 work *Organización de los Museos de Historia Natural*, the Spaniard Salvador Calderón divided natural history museums into two major types. Firstly, there were those museums 'destined to the knowledge of a place'. Secondly, there were those 'that dedicate themselves to the progress of science, without any form of limitation'. In the first type of museum, Calderón explained, the curators should concentrate on the completeness of their collections, without concerning themselves overly much as to the quality of all the items on display, 'since, when one attempts to show all of the productions of a single locality, the choice [of specimens] is restricted'. In the second type, quality was of utmost importance. It was also more easily attainable, as the directors of these latter museums were able 'to choose freely between all known [specimens] in the formation of their collections'. Whilst one might assume that the local museum was consequently inferior to its general counterpart, this was not necessarily the case, for both models had their own distinct advantages. The general museum benefited from a wide range of material and flaunted pristine specimens from across the globe. The local museum, conversely, specialised in a particular region of area of interest and researched it exhaustively. Able 'to exhibit the material that constitutes its field with admirable detail...to which the [general museum] can never aspire, not even when these enjoy the immense

⁶⁶ Burmeister, 'Sumario', p.3

resources that only England is capable of supplying to such institutions', it privileged comprehensiveness over diversity, depth over breadth.⁶⁷

Calderón's definition was significant for museum directors in post-independence America, who had to make decisions about the scope of their respective institutions. Where the Real Gabinete in Madrid had collated artefacts from across the globe, especially from Spain's overseas possessions, most Spanish American museums espoused more modest ambitions. They approximated more closely to Calderón's prototype of a 'local' museum, focusing on the fauna, the flora, and especially the mineralogy of their respective nations. They hoped to impress both domestic and international audiences with the natural bounty of their new states and they also aspired to fortify fragile national identities by collecting and exhibiting in one place the native productions of a specific territory. As Irina Podgorny and Margaret Lopes have observed, 'the creole elites of the independent republics sought to overcome the economic, social and cultural fragmentation resulting from the rupture of the colonial order by discovering and surveying new reserves of natural resources'.⁶⁸

The local emphasis of the certain Spanish American museums can be detected from the items they solicited and displayed. Take, for example, the Museo Público de Buenos Aires. In the decree establishing the institution, Rivadavia instructed the Academy of Medicine and the Exact Sciences to assemble what he called 'a demonstrative collection of the geology of the country and another of the birds of the same'.⁶⁹ The Minister proposed, likewise, to gather shells from the shores of

⁶⁷ Salvador Calderón, *Organización de los Museos de Historia Natural*, Madrid, El Correo, 1884, p.9

⁶⁸ Lopes and Podgorny, 'The Shaping of Latin American Museums of Natural History', p.110

⁶⁹ *Decreto que ordena el establecimiento de un Museo de Ciencias Naturales, firmado por el ministro de Relaciones Exteriores y Gobierno, Bernardino Rivadavia, Buenos Aires, 31 December 1823*

Argentina, indicating that ‘the orders and necessary instructions will be sent to the command in Patagones for the formation of a collection’.⁷⁰ Observing the museum’s gradual recovery from its inauspicious beginnings, the Briton Beaumont reported that its director Carlos Ferraris directed his collecting activities primarily at local specimens, commenting that the Italian ‘used to go out to shoot birds, beasts and reptiles about the river’s banks and the islands’ – ‘the river’ being the Río de la Plata.⁷¹ The Secretary of the Academy of Medicine, Juan Antinio Fernandez, also stressed the importance of studying local nature, specifically Argentina’s flora and geology, and he savoured the potential benefits of such research. ‘Articles 13 and 14 [of the Academy’s programme of investigation] are dedicated to exploiting two kingdoms of nature which are loaded with riches’, stated Fernandez, ‘and which await in the country only the work of an intelligent hand to command it in prosperity and abundance’.⁷²

Whilst these early plans were not necessarily adhered to in the years following the museum’s foundation, two subsequent catalogues do suggest a continued interest in native fauna and flora. In his *Memoria presentada a la Asociación de Amigos de la Historia Natural del Plata sobre el estado del Museo* (1856), Ricardo Manuel Trelles alluded to several local species on display and advocated the procurement of others. The museum’s collection of birds contained, according to Trelles, ‘some nests and eggs of many species of birds of the country, acquired recently’,⁷³ whilst the majority

⁷⁰ Ibid.

⁷¹ Beaumont, *Travels*, p.216

⁷² Fernandez, *Discurso*

⁷³ Ricardo Manuel Trelles, *Memoria presentada a la Asociación de Amigos de la Historia Natural del Plata sobre el estado del Museo y demás relativo a la institución*, Buenos Aires, Imprenta de ‘El Orden’, 1856, p.13

of the quadrupeds had been classified 'following the descriptions and nomenclature of Azara, since almost all of the specimens in this collection of animals are from these countries, and have been described by the distinguished traveller'.⁷⁴ A small dolphin with a beak particularly excited Trelles, who judged it to be different from another similar animal found at the mouth of the Ganges, and who speculated, therefore, that it would 'call the attention of the friends of science'.⁷⁵ Less impressive was the museum's collection of fish, which Trelles considered to be 'few, and in a poor state of conservation', yet the Argentine was certain that this defect could be remedied merely by searching local waters. 'This collection can be restored and greatly increased without doing more than exploiting the species that our lovely river offers', Trelles prophesied confidently.⁷⁶

Reviewing the same museum in 1864, the Prussian Germán Burmeister furnished similar observations, praising Ferraris' collecting efforts. Burmeister indicated that Ferraris had 'enriched [the museum] with many objects from the country, principally with birds, prepared with his own hand', amongst which a swan with a long black neck, 'a species unique to South America and quite common in the country', received an honourable mention.⁷⁷ The swan had sadly dematerialised by the time Burmeister inspected the museum, but a collection of some five hundred species of birds could still be seen. This collection included 'many species of the good and pretty birds of South America', and the Prussian estimated that 'in the museum one may find half of the animals known in this part of the world, although not all of

⁷⁴ Ibid., p.11

⁷⁵ Ibid., p.11

⁷⁶ Ibid., p.13

⁷⁷ Burmeister, 'Sumario', p.2

the skins are mounted, a circumstance that makes the collection appear smaller than it is in reality'.⁷⁸

What most interested Burmeister, however, and what he thought should be the museum's primary focus, were the fossil bones of antediluvian mammals. During his tenure as director, the Prussian accorded this section of the institution the greatest importance, and he championed the view that the museum of Buenos Aires should devote most of its energies to the remains in which the country abounded. 'This', declared Burmeister, 'is the richest part of the Museum of Buenos Aires, the terrain of this province being the most abundant deposit of these objects that is known up to now in the whole of the earth'. It was therefore appropriate that Buenos Aires should house 'the most precious collection of the [fossil bones] known in this part of the world', establishing itself as a specialist centre for prehistoric fauna.⁷⁹

A comparable drive to exhibit and study local nature may be seen in other South American countries. In Venezuela, for example, natural objects were solicited for a Venezuelan Industrial Exhibition that was to take place on 10 December 1864. The commission in charge of the exhibition drafted a list of the objects to be collected, indicating where such specimens might be found, and how they should be packaged and labelled, and it printed two hundred copies of these instructions for distribution to the different provinces. The products that the commission requested were all from Venezuela, the point of the exhibition being to display in a single location 'the varied collection of the different articles that constitute our territorial wealth' and to enable each state 'to flaunt its natural products, exhibiting the benefits

⁷⁸ Ibid., p.9

⁷⁹ Ibid., p.7

of its soil'.⁸⁰ The exhibition's organisers specified a variety of native minerals, vegetables and animals that they wished to showcase, including gold, silver, mercury, bananas, curare, rubber, skins of the jaguar and the anteater, teeth of the caiman and hooves of the tapir.⁸¹ They also enjoined contributors to remit items not mentioned on the list and known only in particular localities, insisting that 'every stone, plant or animal will be received with pleasure, especially if it bears that information already indicated regarding its provenance, name, uses etc'.⁸²

This emphasis on local nature was dictated partly by necessity, since the new Spanish American republics did not, like pre-independence Spain, possess a vast empire offering natural products from across the globe. It was also encouraged, more positively, by a desire to catalogue the natural resources of the new post-colonial states and to display them for both domestic and international audiences. The commission directing the Venezuelan Industrial Exhibition anticipated that the event would provide 'a stimulus to the industry and trade of every town' within the republic, and it grouped desired plant specimens specifically according to their uses, requesting 'woods used in construction', 'plants useful for dyes' and 'medicinal and venomous plants'.⁸³ Trelles, meanwhile, translated a memoir by the Frenchman Alfredo M. du Graty on the mineral productions of the Argentine Confederation, in the hope that it would 'contribute to extending the knowledge of the riches of our country'.⁸⁴ He also lamented that the provenance of some of the specimens in the

⁸⁰ *Indicación de algunos de los principales objetos de historia natural, es decir minerales, vegetales y animales, que deben solicitarse para la exhibición industrial venezolana que tendrá lugar el 10 de Diciembre de 1864 en Caracas, Caracas, Imprenta de los Estados Unidos de Venezuela, 1864, p.4*

⁸¹ *Ibid.*, pp.7-20

⁸² *Ibid.*, p.6

⁸³ *Ibid.*, p.4

⁸⁴ Trelles, *Memoria*, p.17

Museo Público de Buenos Aires was unknown, a defect which, in his view, rendered them useless. ‘What use, for example, are the many rich minerals that it has’, sighed Trelles, ‘if the mines that produce them are unknown?’⁸⁵

Beyond mere utility, there was a sense that the collection of local specimens would confer a certain scientific kudos upon the infant Spanish American republics. Calderón, as we saw earlier, judged the chief asset of the ‘local museum’ to be its comprehensive coverage of the natural products of a particular region, or branch of science. Other writers implicitly equated the retention of American artefacts in American museums with national sovereignty, presenting Spain’s former colonies as a site for research and not simply a lucrative source of exotic specimens.

Emblematic of this view was a passage in a letter from Bonpland to the Larrañaga concerning some suspected megatherium bones currently in possession of the latter. Commenting on this scientifically valuable find, the French naturalist advised his Uruguayan counterpart to send a scale drawing of the bones to the eminent comparative anatomist Georges Cuvier, in Paris. He counselled Larrañaga, however, to conserve the actual fossils in Uruguay, a move which he considered to be ‘in your interests and those of your country’.⁸⁶

⁸⁵ Ibid., p.6

⁸⁶ Letter from Aimé Bonpland to Dámaso Antonio Larrañaga, 15 September 1818, in Gallinal, *Escritos*, Vol. III., p.271

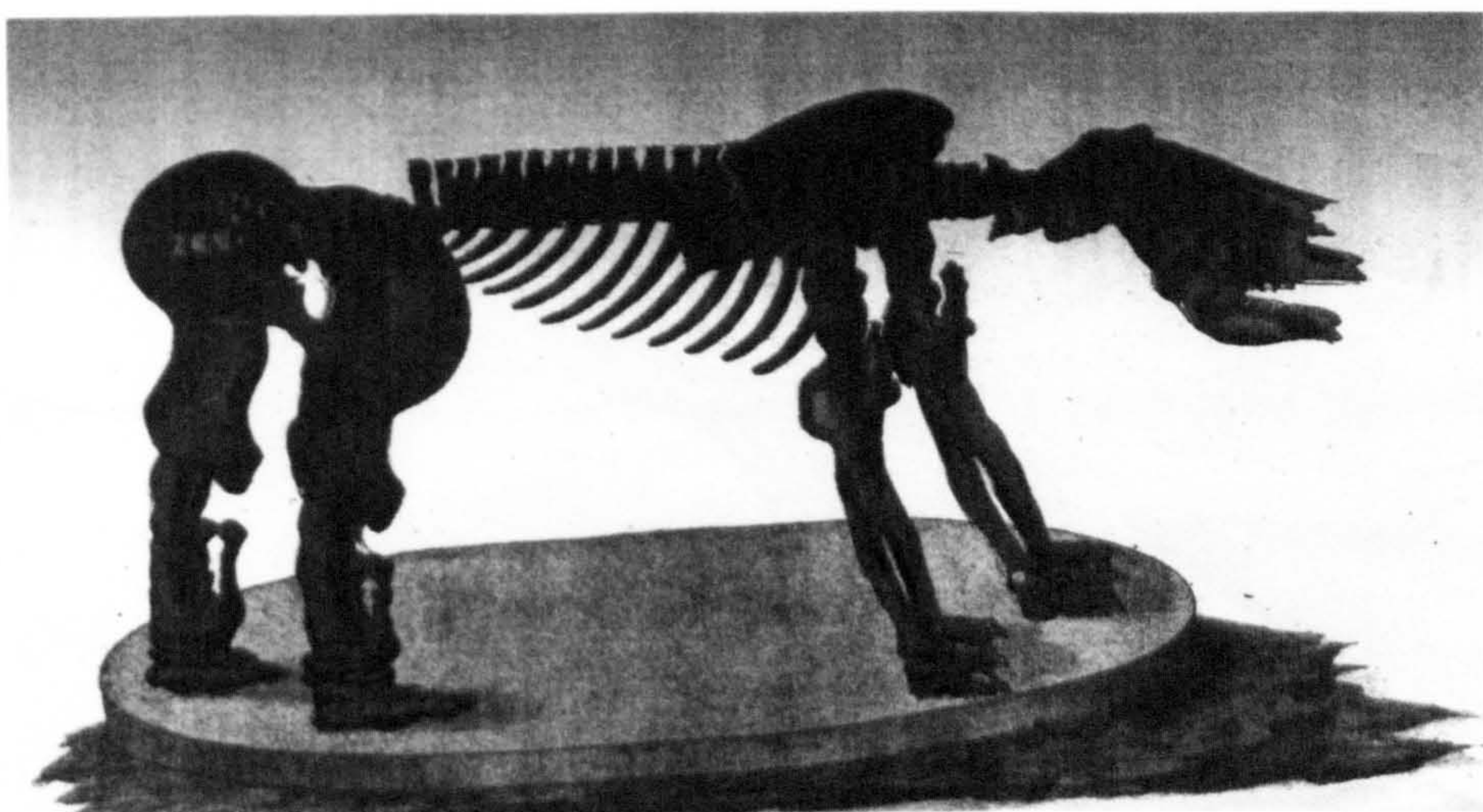


Fig.1: Dámaso Antonio Larrañaga, the Madrid Megatherium, in Alejandro Gallinal, *Escritos de Don Dámaso Antonio Larrañaga*, Montevideo, Instituto Histórico y Geográfico del Uruguay, Imprenta Nacional, 1922, Atlas: Parte II, Zoología, Palaeotología y Mapas

Burmeister likewise insisted that Argentina's palaeontological wonders remain in the museums of that nation. He regretted the loss of fossil bones to collectors in Europe, but congratulated the provincial government upon the introduction of recent legislation proscribing the expatriation of these precious relics. 'The most curious and complete skeletons of antediluvian animals that appear in the museums of London, Paris, Madrid, Turin etc. have all come from the Province of Buenos Aires', stated Burmeister. 'But now, thanks to the wise measure of the Government of the Province, designed to prohibit the export of fossil bones, the Museum of Buenos Aires will see its collection increase from day to day'. This was a commendable development, for 'it is a duty of patriotism for the children of the country to preserve these precious things from their soil and to deposit them in the Museum of their fatherland'.⁸⁷

Elsewhere, Burmeister expatiated on the advantages of the 'local' museum, and its suitability for the new states of South America. He also exposed the

⁸⁷ Burmeister, 'Sumario', p.7. The children of the patria had not always been so protective of their palaeontological heritage. The British chargé d'affaires in Buenos Aires, Sir Woodbine Parish, relieved the Argentines of several impressive fossils in the 1830s, whilst Rosas' chief propagandist Pedro de Angelis, furnished the Real Gabinete with a tail for its famous megatherium. According to José Gogorza, he 'ceded [this precious appendage] to the Museum for 2.000 pesetas'. See Gogorza, *Reseña y Guía*, p.83.

inconsistencies he observed in existing institutions, and explained why these detracted from the scientific worth of their collections. In his book *Viaje por los estados del Plata con referencia especial a la constitución física y al estado de cultura de la República Argentina realizado en los años 1857, 1858, 1859, 1860*, the Prussian commented that ‘this class of collections could be of great use for the travelling naturalist, if he were to find assembled there at least the types of the country, and in this way have the opportunity to survey at a glance the local fauna corresponding to the collection that he is examining, be it ornithological, entomological or of any other division of the animal kingdom’. Burmeister complained, however, that most of the collections he scrutinised did not conform to this rule. They were too eclectic and inconsistent in their selection of specimens, more concerned with the existence of a museum than with its contents, and they disappointed the Prussian, who wanted to see the typical and novel aspects of new world fauna. ‘This, consideration, the only one that would lend these collections a certain value and scientific interest, is not taken into account’, scolded Burmeister. ‘Everything is assembled that can be gathered, or that has already been obtained, and it is installed so that one may say “we have a museum”, but little attention is given to what has been amassed there, or to how it may be given scientific importance’. The museums of Montevideo, Buenos Aires and Paraná were all, according to Burmeister, guilty of rather catholic tastes, their collections containing ‘in addition to some interesting objects from the country, also many foreign ones that did not belong to it’. Only the Museo de Lima sported a specimen that excited the Prussian’s interest – a previously unknown species of armadillo from the region of Guayaquil – and this was, in Burmeister’s view, the only

‘preparation of true scientific value’ on display in the museum, and the only object that merited extended observation.⁸⁸

Burmeister’s suggestion that South American museum curators were in fact somewhat indiscriminate in the selection of specimens is to some extent corroborated by his own and Trelles’ catalogues of the Museo Público de Buenos Aires, which feature several objects that were not native to Argentina. Trelles remarked, for instance, that the majority of the apes on display in the museum came from Brazil or Africa,⁸⁹ whilst many of its minerals originated from Chile, and a substantial collection from France – the latter donated to the institution in its early years and still catalogued only in French.⁹⁰ Burmeister, meanwhile, stated that, of the five hundred species of birds exhibited in the museum, ‘two hundred and fifty species with four hundred individuals are from Europe, Brazil and the other Argentine Provinces’,⁹¹ and both men mentioned an Egyptian mummy (Burmeister in fact mentioned three) as featuring in the collection.⁹² The presence of these items suggests that South American museum curators sometimes found it hard to confine themselves to the products of their own (or adopted) countries. Their conception of what qualified as a ‘native’ specimen was somewhat flexible, and they perhaps harboured ambitions for a more universal status. Patience Schell has identified precisely these inconsistencies in the career of Rodolfo Armando Philippi, director of the Museo de Chile (1853-1904), who ‘emphasised a commitment to a ‘Chilean’ collection in his writings’, but whose

⁸⁸ Germán Burmeister, *Viaje por los estados del Plata con referencia especial a la constitución física y al estado de cultura de la República Argentina realizado en los años 1857, 1858, 1859 y 1860*, Buenos Aires, Unión Germánica en la Argentina, 1944, Vol. II, p.94

⁸⁹ Trelles, *Memoria*, pp.10-11

⁹⁰ *Ibid.*, p.17

⁹¹ Burmeister, ‘Sumario’, p.9

⁹² Trelles, *Memoria*, pp.9-10 and Burmeister, ‘Sumario’, p.5

‘use of the museum’s budget [to purchase exotic artefacts from across the globe] suggests a broader project which went beyond representing Chile to foreign and local visitors, to include bringing the world to Chile and establishing the museum as a manufacturer of science internationally’.⁹³

The Nature of the Nation

Burmeister’s concerns were primarily scientific. He wanted American museums to concentrate on local productions because this facilitated the work of the travelling naturalist and enabled him to see the fauna and flora of a particular country at a single glance. For other writers, however, natural history had more patriotic and sentimental value. It offered a means of representing the nation to both domestic and international audiences. It also had the potential to fortify fragile national identities in states that were newly independent and ethnically diverse, and in which, as John Elliott has observed, ‘a sense of nationhood was an elusive concept, more prone to generate rhetoric than to encourage an engagement with reality’.⁹⁴

One important component in the formation of national identities was the construction of a national past. In post-colonial Spanish America, this meant a national past distinct from that of Spain and unique to America, and it frequently involved recourse to the continent’s Pre-Colombian cultures. Creole elites, anxious to endow their newly-created nation states with a sense of continuity and antiquity, often mustered their Amerindian ‘ancestors’ as symbols for and precursors of their respective nations, though they were always careful, as Mark Thurner has observed,

⁹³ Schell, ‘In the Service of the Nation’, p.7

⁹⁴ Elliott, *Empires of the Atlantic World*, p.397

to dissociate ‘the “glorious” native past from the “miserable” native present’.⁹⁵

Rebecca Earle has shown how, during and after the wars of independence, ‘the insurgents...imbedded their view of Spanish America’s history in the very geography of the continent’, supplanting Spanish place-names with indigenous ones (e.g. ‘Mexico’ for ‘New Spain’) and incorporating Indian motifs on national flags, coins and medals.⁹⁶ Sara Castro-Klarén likewise emphasises the importance of the Amerindian past for creole nation-builders, particularly the contribution of archaeology, and she argues that the study of Amerindian ruins ‘stretches the time line of the nation and creates immemorial “ancestors” for the post-colonial nation...allow[ing] a mapping of the nation that reconfigures territory by privileging forgotten or even forbidden sites of memory’.⁹⁷

Not all of the new Spanish American nations had a readily usable indigenous past, however, and in those countries that lacked a glorious Amerindian heritage the natural world sometimes offered a viable alternative. The idea that nature could supplement or supplant history and culture in the construction of national identity surfaces in Humboldt’s *Personal Narrative*. In his travel account, Humboldt recorded how he and Bonpland scaled the Silla de Caracas, a mountain overlooking the Venezuelan capital to survey its fauna and flora and calculate its altitude. Upon their return to Caracas, the travellers were accosted by their creole acquaintances, anxious to hear their findings. The caraqueños were, however, ‘little satisfied with the result of

⁹⁵ Mark Thurner, ‘Peruvian Genealogies of History and Nation’, in Mark Thurner and Andrés Guerrero (eds.), *After Spanish Rule: Postcolonial Predicaments of the Americas*, Duke University Press, Durham, 2003, p.141

⁹⁶ Rebecca Earle, ‘Sobre Heroes y Tumbas’, *Hispanic American Historical Review* 85:3, August 2005, pp.385-387

⁹⁷ Sara Castro-Klarén, ‘The Nation in Ruins: Archaeology and the Rise of the Nation’, in Sara Castro-Klarén and John Charles Chasteen (eds.), *Beyond Imagined Communities: Reading and Writing the Nation in Nineteenth-Century Latin America*, Baltimore, John Hopkins University Press, 2000, p.164

a measurement which did not give the Silla the elevation of the highest summit of the Pyrenees', and they refused to accept the Prussian's calculation. Reflecting on the matter, Humboldt, sympathised with this reaction and absolved the creoles for their obstinacy. 'How can we blame national feeling which attaches itself to monuments of nature in a spot where the monuments of art are nothing?' mused the Prussian. 'How can we wonder that the inhabitants of Quito and Rio Bamba, proud for ages of the height of Chimborazo, mistrust those measurements that elevate the mountains of Himalaya in India above all the colossal Cordilleras?'⁹⁸

The relationship between nature and nation sketched here by Humboldt was evidently *unscientific*, with accurate calculations puncturing longstanding assumptions. Other commentators, however, suggested explicitly that science could help in the construction of a national past. They conceived scientific investigation as a substitute for human history in regions where the Pre-Colombian past was less than spectacular and archaeological monuments sparse. A few openly embraced science as key to the formation of an alternative national history.

One exponent of this view was the Uruguayan, Dámaso Antonio Larrañaga. As Gustavo Verdesio has shown, Uruguay's Pre-Colombian history was not particularly grandiose in the eyes of nineteenth-century nation-builders, lacking as it did any Amerindian civilisation to rival the Aztecs or the Incas, and consisting mainly of primitive hunter-gatherers like the Charruas and the Guaranís.⁹⁹ A resourceful

⁹⁸ Alexander von Humboldt and Aimé Bonpland *Personal Narrative of Travels to the Equinoctial Regions of the New Continent, During the Years 1799-1804*, Translated by Helen Maria Williams, London, 1822, Second Edition, Vol. III, p.524

⁹⁹ Gustavo Verdesio, 'An Amnesiac Nation: The Erasure of Indigenous Pasts by Uruguayan Expert Knowledges', in Castro-Klarén and Chasteen (eds.), *Beyond Imagined Communities*. Verdesio argues that Amerindians are largely absent in nineteenth-century Uruguayan narratives of national identity. He suggests that the lack of impressive Pre-Colombian monuments in Uruguay led political elites, historians, archaeologists and literary figures to dismiss the country's indigenous past and to concentrate predominantly on its European heritage, creating 'a very European nation that excludes any contributions coming from non-European ethnic groups'. The historian Juan Manuel de la Sota thus

Larrañaga therefore proposed geology as an alternative vehicle for accessing the nation's history, expressly construing it as a viable substitute for a glorious indigenous heritage. 'In a country whose history extends little beyond three centuries', ruminated Larrañaga, 'and where our ancestors [he presumably meant the Amerindians], have left us no monuments nor the least vestiges from which to conjecture something that could fill this great void, it seems that we have no other means than to resort to Geology, that new science that goes beyond all profane histories, and with whose lights in very few years interesting discoveries have been made about the great events of our globe'. Larrañaga explained that geology obviated the need to concoct 'fables with which to fill obscure times'. He advised his compatriots to abandon their search for ancient monuments or human chronicles, and to interrogate 'Nature, a book that is always open, and that is as truthful as it is interesting'.¹⁰⁰

What Larrañaga had in mind specifically was the study of shells and other fossilised creatures. The Uruguayan recalled how he had personally been swept up in conchology, 'that mania of the century, or, I might rather say, that innocent distraction from more serious studies, collecting the most beautiful testaceans that our country produced, or which it was possible to obtain'.¹⁰¹ He used his discoveries to reconstruct the geological history of Uruguay, suggesting, for example, that the

recycled negative Spanish views of Uruguay's Indians in his *Historia del territorio Oriental del Uruguay* (1841), whilst Francisco Bauzá placed the Amerindian at an inferior stage of human evolution in his *Historia de la dominación española en el Uruguay* (1895). Verdesio observes that both men, and indeed most of the historiography, glossed over the massacre of the Charruas in 1831 by Fructoso Rivera, implying that the Indians died in battle when in fact Rivera invited them to a barbecue and then ambushed them.

¹⁰⁰ Dámaso Antonio Larrañaga, 'Memoria geológica sobre la Piedra de cal de Buenos Aires por un hijo del país', in Gallinal, *Escritos*, Vol. II, p.21

¹⁰¹ Dámaso Antonio Larrañaga, 'Memoria geológica sobre la reciente formación del Río de la Plata, deducida de sus conchas fósiles', in Gallinal, *Escritos*, Vol. II, p.8

presence of shells in inland regions confirmed Moses' account of the biblical flood, and he surmised from the distribution of certain species of testaceans that the course of the Paraná and other rivers had once differed from its current trajectory. Contemplating the scientific significance of his discoveries, Larrañaga noted that certain fossilised mammals exhumed in recent years in Europe seemed 'to have an affinity with those of South America, and in particular with those of these provinces [the provinces of the Rio de la Plata]', and he observed proudly that 'nowhere has there been found anything more gigantic or extraordinary than the Megatherium of Cuvier, which was found in the river Luján'.¹⁰² He hoped that his own endeavours would 'call the attention of our youngsters to the study of nature and to its innocent investigations, who, as they find in [these investigations] a very pure pleasure, will also contribute in a great way to the glory and happiness of our country'.¹⁰³ Here, therefore, was an overt expression of the relationship between nature, science and the national past.

Much the same sentiments surface in Sarmiento's biography of Muñiz. Discussing the physician's contribution to the emerging discipline of palaeontology, Sarmiento described how Humboldt 'discovered an old world in the New World' through his study of the region's fossils, and he postulated that the discovery of the megatherium near Luján in 1789 had revolutionised contemporary conceptions of the past. 'The day that the gigantic Megatherium was exhumed from the river Luján, and its bones mounted, almost complete, in the Gabinete de Historia Natural de Madrid, a new chapter opened in the History of the Creation', proclaimed Sarmiento.¹⁰⁴ This

¹⁰² Larrañaga, 'Memoria geológica sobre la Piedra de cal', p.23

¹⁰³ Ibid., p.24

¹⁰⁴ Sarmiento, *Muñiz*, p.198

event promised to have as great an impact on ideas about the antiquity of the globe as the examination of Pre-Colombian ruins such as Palenque, whilst the sheer size of the Megatherium and other antediluvian mammals augured well for the fertility of the Argentine pampas.¹⁰⁵ As Irina Podgorny has argued, ‘In the case of the fossilised mammals of Buenos Aires, their size and abundance proved that the pampas were a land capable of sustaining giant herbivores and suitable, consequently, for cattle and crops’.¹⁰⁶

Not only did palaeontology offer Argentina a chance to formulate a prestigious prehistoric past, but it also, in Sarmiento’s view, offered young Argentines an opportunity to acquit themselves with distinction in a new and exciting branch of science. Argentine youth, Sarmiento admitted, had not thus far distinguished itself in the natural sciences, preferring to graduate in law or theology. The novelty of palaeontology, however, meant that this lack of acquaintance with established learning might prove less of a handicap than in other disciplines; indeed, it might even constitute an advantage, since it would free them from the preconceptions and false assumptions that had inhibited some of their European contemporaries. Sarmiento explained that it was experts in geology and comparative anatomy such as Cuvier and Lyell who had most strenuously resisted new conceptions about prehistoric fauna. Young Argentines were not saddled with these outdated notions, and Sarmiento suspected that they would excel at a science for which their homeland provided ample material. ‘The turnaround that has occurred in science in recent years’, reflected Sarmiento, ‘this recommencement of the account, if we may put it thus, has permitted the South American youth, so ill-prepared for scientific studies, which did not seem to

¹⁰⁵ Ibid., p.200

¹⁰⁶ Irina Podgorny ‘Los Gliptodontes en París’, p.313

have any importance to them, to join the caravan of explorers, even if it is only to collect material, as persons acquainted with the terrain, and to help in the great work'.¹⁰⁷ Muñiz had set a fine example of what could be achieved through ingenuity and perseverance, 'as the catalogue of pieces that he supplied with abundance to the Natural History museums of several nations demonstrates'. Sarmiento exhorted the next generation to emulate his exertions.¹⁰⁸

One of the individuals to heed this call was Francisco Pascasio Moreno, who, like Sarmiento and Larrañaga, construed palaeontology, and the related discipline of anthropology, as an alternative window on Argentina's Pre-Columbian past. In the course of several field trips to Patagonia in the 1870s, Moreno collected a series of Indian skulls, which he believed to be of great antiquity. Craniological measurements revealed that these skulls differed in form from those of contemporary Patagonians, and led Moreno to conclude that he had discovered a new, more ancient type of man on Argentine soil, a discovery he christened the 'Patagón antiguo'. Detailing his research in an article for the Buenos Aires newspaper *La Nación*, Moreno consciously presented his find as a contribution to Argentina's pre-conquest history. The scientist expressed his desire 'to reconstruct the history of our fossilised grandparents [abuelos fósiles]', and he voiced the belief that his studies would reveal a Pre-Columbian past that had long remained hidden.¹⁰⁹ 'We have in our vast territory all of the desirable elements to know our origins and our advances', asserted Moreno, 'from the most

¹⁰⁷ Sarmiento, *Muñiz*, p.200

¹⁰⁸ *Ibid.*, p.201

¹⁰⁹ Francisco Pascasio Moreno, 'El Estudio del Hombre Sud-Americano', *La Nación*, n° 2381 and 2387), Buenos Aires, Imprenta a vapor de La Nación, 1878, p.22

barbarous tribes to the most civilised, already extinguished, and, assembling them, we can perpetuate the memory of our indigenous ancestors'.¹¹⁰

Moreno's portrayal of the Amerindians as his 'ancestors' was, of course, disingenuous, since he was himself of entirely European stock. It signified, however, an attempt to appropriate Argentina's Pre-Colombian inhabitants for the new nation, and also, as Mónica Quijada has noted, an Argentine tendency to define their Indian 'ancestors' less by genealogy, than by their having inhabited the same geographical territory.¹¹¹ Elsewhere in the same article, Moreno revealed his dual identity as part territorial heir of the Amerindians, part biological descendent of the Spanish conquistadors, when, having decried the vandalism perpetrated by the latter against indigenous monuments, he argued that it was the duty of himself and his fellow creoles to expiate their sins. 'The memory of these depredations...angers and discomforts [me]', wrote Moreno, 'and only science can erase it, trying with its efforts to reconstruct the old splendour of the owners of the continent, cleansing those of descend from them of that stain, which...fell upon our European fathers, the conquistadors'.¹¹² This rather confusing hybrid identity exemplifies the dilemma of many creoles, who wished simultaneously to extend their roots in America beyond the Spanish conquest and to emphasise the distance between themselves and contemporary Indians.

¹¹⁰ Ibid., p.26

¹¹¹ Mónica Quijada, '¿"Hijos de los Barcos" o Diversidad Invisibilizada? La Articulación de la Población Indígena en la Construcción Nacional Argentina (Siglo XIX)', *Historia Mexicana*, LIII:2, 2003, p.496. Quijada argues that Argentine evocations of the Pre-Colombian past emphasised a shared territory, and not shared blood. She contrasts this with the Mexican identity model, which stressed 'a genealogical ascendance', and focused on the racial miscegenation. In Argentina, 'the connection between the first group [to inhabit the country] and the current nation, and vice versa, was established via a territorial base; that is to say, it is territory and not blood that is the ultimate foundation of continuity'.

¹¹² Francisco Pascasio Moreno, 'El Estudio del Hombre Sud-Americano', *La Nación*, n° 2381 and 2387), Buenos Aires, Imprenta a vapor de La Nación, 1878, p.16

Conclusion

Independence witnessed a surge of interest in the natural sciences. American scholars and politicians equated scientific excellence with civilisation and modernity. They savoured the potential economic benefits that would arise from the study of local nature and they conflated political freedom with scientific independence. The New Granadan Caldas, speaking (as it turned out, prematurely) in 1812, exhorted his countrymen, having ‘thrown off the political yoke of Europe’ to ‘throw off also that scientific dependence that degrades us and that maintains us in a literary ignorance more ignominious than slavery itself’.¹¹³ The Uruguayan Larrañaga echoed this early enthusiasm in 1816, encouraging his compatriots to take up astronomy, and he predicted that their studies would not merely benefit Uruguay, but would advance the discipline as a whole. ‘This is the country, in my judgement, of astronomers’, rhapsodised Larrañaga. ‘Here you do not have that cloud-covered sky that hid the stars from [Johannes] Kepler, nor those enormous mountains that, through their attraction, perturbed the pendulum of [Charles Marie] de la Condamine and Jorge Juan’, hence ‘the observations that *we* make in such a clear sky at such a notable parallax to that of Europe will end up perfecting Astronomy, and the arcs that *you* measure from the meridian in such immense plains will remove all doubts as to the figure of the earth, one of the most important problems [in this science]’.¹¹⁴

In the event, such predictions proved overly optimistic. The disruption unleashed by the wars of independence and subsequent political turbulence truncated the scientific projects orchestrated by the Spanish Crown. Many of the most

¹¹³ Caldas, ‘Almanaque de las Provincias Unidas del Nuevo Reino de Granada para el año bisiesto de 1812, tercero de nuestra Libertad’, in *Obras*, p.13

¹¹⁴ Larrañaga ‘Oración Inaugural’, in Gallinal, *Escritos*, p.144. Note how Larrañaga refers to ‘the observations *we* make’ and ‘the arcs *you* measure’. He casts his fellow Americans as active subjects in the study of nature, not merely as passive spectators.

distinguished creole scholars perished in the revolution, whilst others were diverted into politics, abandoning their scientific research. Foreign naturalists were drafted in to replace these scholarly losses, but they were not always totally committed to the scientific advancement of their adoptive nations. Even when they were, the suspicion and apathy of many Americans thwarted their ambitious plans, engendering disappointment and frustration.

No single career illustrates the perils of post-independence science better than that of Bonpland. The French botanist was, as we have seen, thwarted in his efforts to teach natural history in Buenos Aires, on account of the political turmoil that engulfed the region. Dispirited, he retreated to Corrientes to pursue his botanical researches, only to find himself brutally abducted in 1821 by troops belonging to the Paraguayan dictator, Dr. José Gaspar Rodríguez de Francia, and transported in fetters to Paraguay, where he stood accused of conspiring against Francia with the local warlord Francisco Ramírez – an allegation of dubious plausibility, given that ‘when they apprehended him, the head of Ramírez had for some time been exposed in an iron cage at Santa Fé’.¹¹⁵ Repeated petitions from Bonpland’s supporters (including such distinguished persons as the Emperor of Brazil, Humboldt and the liberator Simón Bolívar) failed to secure his release, and he languished in Paraguay for nine years, ‘although guilty of no offence, save his devotion to botanical science’.¹¹⁶ He was, according to the North American ambassador, Charles Washburn, treated less leniently than Francia’s second most famous prisoner, the notorious warlord José Gervasio Artigas, for ‘as he had cut no throats, nor baked anybody in the sun, as had Artigas, he had not the necessary title

¹¹⁵ Johann Rengger and Marcellin Longchamps, *The Reign of Doctor Joseph Gaspar Roderick de Francia in Paraguay, Being an Account of a Six Years’ Residence in that Republic*, New York and London, Kennikat Press, 1971 (First Published in 1827), p.81

¹¹⁶ Thomas J. Hutchinson, *The Paraná with Incidents of the Paraguayan War from 1861 to 1868*, Edward Stanford, London, 1868, Footnote p.273

to the gratitude of Francia, and he did not, like the great gaucho, receive any pension from the Dictator'.¹¹⁷

Eventually liberated in 1831, Bonpland returned to Corrientes and attempted to rebuild his life, ultimately collaborating with the local governor, Juan Pujol, to establish a natural history museum in 1854. This museum promised great things, since it boasted, amongst other exhibits, a herbarium of more than 3000 plants collected by Bonpland since his arrival in Argentina. Like so many of the Frenchman's former projects, however, the institution succumbed to the dual scourges of apathy and civil war, and the Briton William Hutchinson, visiting the area in 1866, found the museum gone and its disappearance un lamented. 'No-one in Corrientes from whom I inquired on the subject knows the *locus in quo* of the former museum – for it no longer exists, although established only twelve years back', scoffed Hutchinson incredulously, 'and of the whereabouts of Bonpland's collection they are equally ignorant'. 'Such is scientific fame in South America!'¹¹⁸ It was a damning epitaph for post-independence natural history.

¹¹⁷ Charles Washburn, *The History of Paraguay, with Notes of Personal Observations and Reminiscences of Diplomacy under Difficulties*, Vol. I, Boston, Lee and Shepherd, 1871, p.262

¹¹⁸ Hutchinson, *The Paraná*, p.274

Chapter 7 – Naturalistes sans Frontières

In 1826, a mysterious stranger presented himself to the Brazilian admiral in Montevideo, which was then under Brazilian rule. The stranger introduced himself as the illustrious Count of Potowski. He announced that he was a ‘great naturalist’, sponsored by the Parisian Musée d’Histoire Naturelle, and, when asked for proof of his profession, he flourished a passport, the wording of which described him as ‘a man of letters, a wise naturalist and a member of numerous scientific societies’. Potowski also carried a large quantity of boxes, which he claimed were ‘full of preparations of natural history’. He persuaded the admiral to ship these precious items to Buenos Aires, along with their famous owner, and he arrived in style in the Argentine capital, where the porteños fêted him with ‘all the honours owing to a noble and wise personage’.

Some months after Potowski graced Montevideo with his presence, another French naturalist disembarked in the city. The second savant, Alcide d’Orbigny, was a young expert in molluscs at the Paris Museum, then in the early stages of an eight-year expedition to South America, and he, like Potowski, was bound for Buenos Aires. Conferring with the French Consul in Montevideo, d’Orbigny was surprised to learn that another French naturalist whose name he did not recognise had preceded him to the Banda Oriental. He considered it odd that ‘a savant whose name I had never heard mentioned in Paris’ should have been selected by the French government to explore Patagonia, which Potowski cited as his destination, and his suspicions grew when he scrutinised the Count’s passport, in which the titles ‘man of letters’ and ‘wise naturalist’ ‘seemed to have been added with posterity’. D’Orbigny enquired into the matter, and it emerged at length, that Potowski’s liberal consignment of boxes had indeed been full – not of natural history preparations, ‘but of articles of perfumery

with which he started a business'. An outraged d'Orbigny exposed the Count as an opportunistic fraudster, and he resolved to atone for Potowski's sins by 'offering a better impression of travelling naturalists'. He discovered to his cost, however, that his compatriot's transgressions had already soured the perception of his profession in the River Plate area, where Portuguese authorities refused him permission to travel to Buenos Aires, and where 'the then President [of Argentina] did not want to meet me, confusing me with D..., whom they had unmasked, and who was beginning to be known in the country for what he really was'.¹

The peculiar case of the Count of Potowski seems in many ways like a bizarre but insignificant anomaly. Potowski was not the naturalist he purported to be, but merely an ingenious trickster. He exploited the trappings of the profession for his own dishonest ends, and he abused the good faith of two South American governments.

Strange as the Potowski saga is, however, it raises some important questions and reveals something about contemporary perceptions of the naturalist in Spanish America. The fact that the 'Count' masqueraded as a man of science when he could have impersonated a diplomat, a clergyman or a soldier suggests that he believed the naturalist to be held in high esteem in the former Spanish colonies, and that the disguise would secure him a warm welcome. The fact that Potowski's ploy succeeded, at least initially, implies that this calculation was correct. Yet the fact that the Frenchman duped the Brazilians and the Argentines with relative ease also suggests that the work of the naturalist was still relatively unfamiliar to Americans, who knew that the practitioner of natural history was a respectable and studious man, but who did not necessarily know what equipment he ought to possess, or what titles he should sport on his passport.

¹ D'Orbigny, *Viaje a la América Meridional*, pp.44-45

D'Orbigny's impassioned reaction to Potowski's deception, and the subsequent coldness that he experienced from the Argentine authorities is also revealing. The genuine naturalist's strident denunciation of the fraudster indicates that Potowski had violated an unwritten code of honour amongst naturalists. The Argentines' distrust of d'Orbigny, meanwhile, implies that naturalists were still relatively rare entities in post-colonial Spanish America. Creole elites were predisposed to welcome foreign savants and to aid them with their studies, but the misbehaviour of one such person could easily tarnish the reputation of the profession as a whole and jeopardise the reception of all future scientific explorers.

This chapter focuses in more detail on the figure of the naturalist in Spanish and Spanish American society. It explores how practitioners of natural history conducted, presented and defined themselves in the late eighteenth and early nineteenth centuries. It examines some of the most common stereotypes surrounding men of science in this period, and considers the extent to which these stereotypes gained currency in the Hispanic world.

At the turn of the nineteenth century, definitions of the naturalist were somewhat fluid, as the Potowski case shows. The term 'scientist' did not acquire its modern meaning until the 1830s. The boundaries between professional and amateur, expert and dilettante, were exceedingly blurred, and the naturalist jostled for respect and recognition with the Indian herbalist, the study-bound scholastic and the collector of curiosities. The chapter examines how men of science attempted to carve out a distinctive professional profile on the basis of their equipment, physical feats and moral attributes in the late eighteenth and early nineteenth centuries. It argues that Spanish and creole savants subscribed to prevailing European conceptions of the

heroic, self-sacrificing scientific explorer and it considers where both creole savants and indigenous informants fitted within this rhetorical framework.

Naturalistas, Sabios and Ilustrados

Eighteenth and early nineteenth-century practitioners of natural history did not refer to themselves as scientists. As Ludmilla Jordanova has observed, this term did not emerge until the 1830s, and it was only then that it entered common parlance and assumed its current meaning.² The word 'científico' did exist in eighteenth-century Spain, but it covered a broader spectrum of activities than its modern equivalent. The 1791 edition of the *Diccionario de la Lengua Castellana* defined 'científico' as 'the person who possesses a science, or sciences, and the things related to them'. Its definition of 'science' however, embraced such disciplines as philosophy and jurisprudence, activities that we would not today describe as 'scientific'.³

What did students of the natural world call themselves? For those who specialised in plants, there was the term 'botanista', 'he who professes botany'.⁴ Another possibility was 'naturalista', 'he who deals with, verifies and examines the virtues, properties and qualities of natural entities, especially of animals, plants and minerals etc.',⁵ whilst some plumped for the more generic term 'sabio', 'the person who has and possesses wisdom'.⁶ Occasionally the practitioners of natural history

² Ludmilla Jordanova, *Nature Displayed: Gender, Science and Medicine, 1780-1820*, London and New York, London, 1999, See chapter 4, 'Melancholy Reflection: Constructing an Identity for Unveilers of Nature', pp.69-85

³ *Diccionario de la Lengua Castellana, compuesto por la Real Academia Española, reducido a un tomo para su más fácil uso*, 3rd edition, Madrid, Viuda de Ibarra, 1791, p.219

⁴ *Ibid.*, p.153

⁵ *Ibid.*, p.586

⁶ *Ibid.*, p.742

were described as 'ilustrados', in acknowledgement of their enlightenment.⁷ They could also be called 'literatos', a term that the *Diccionario* defined as 'erudite, doctor and adorned with letters'.⁸

Whilst these definitions may sound somewhat vague, they were in some ways eminently suitable for men whose interests encompassed a broad range of pursuits. The New Granadan Caldas, for example, considered himself primarily an astronomer, but he also collected, classified and sketched the flora and fauna of his native region, took an interest in cartography and meteorology, examined Amerindian ruins and devised a mathematical formula for calculating the altitude of mountains based on the boiling point of water. The Spaniard Azara, meanwhile, only took up natural history by default, having exhausted other intellectual avenues. Azara, who was posted to Paraguay in 1781 to resolve border disputes between Spain and Portugal, initially amused himself in this remote imperial outpost by gathering information on its history and mapping its frontiers, but he soon transferred his attention to the colony's fauna, writing detailed notes on its birds and mammals (he used the older term 'quadrupeds'). The Spaniard's French biographer, Charles Anathuse de Walckenaer explicitly commended Azara for his diligence and versatility. Comparing his subject's career with that of his equally illustrious brother, Nicolás de Azara, Spanish ambassador respectively to Rome and Paris, and a prominent art collector and literary critic, the Frenchman surmised that the trajectory of the naturalist's genius had been determined by his surroundings. 'An active spirit that feels the need to feed the fire that animates it, seizes whatever surrounds it', mused Walckenaer.

⁷ Renan Silva employs this term in his study of the scientific community in late eighteenth-century New Granada. See Renan Silva, *Los Ilustrados*.

⁸ *Diccionario*, p.530

A man endowed with such a soul, transported to Greece or to Egypt, amidst the majestic ruins of Ancient Thebes, or amidst the monstrous Pyramids...[will become] an erudite, an antiquarian or a famous artist. Place that same individual at the foot of Vesuvius, vomiting flames, or close to the blackened skirts of Etna, or amidst the chaos of the Alps and the Pyrenees, and he will undoubtedly be a mineralogist or a geologist. But should he find himself obliged to roam through vast plains, through the thick forests of America, where plants that he has never seen cover the earth and tint it with a thousand different colours; where savage man and animals, the only inhabitants of the deserts, flaunt everywhere unknown forms and singular manners – and he will become a botanist or a zoologist.⁹

Here, then, was a ringing endorsement of the all-round savant, whose keen brain and industrious spirit fitted him to excel in multiple fields.

Dressing the Part

One thing that separated the naturalist from the scholastic or the non-specialist traveller was his reliance upon precision instruments. The possession and use of specialist equipment ranging from magnifying glasses to barometers enhanced the accuracy and credibility of the naturalist's observations. They formed an integral part of his professional identity in an environment where voluminous equipment made by master craftsmen evidenced scholarly rigour. Susan Faye Cannon has observed how Humboldt styled himself as a 'scientific traveller' rather than an explorer, because 'he

⁹ Azara, *Viajes*, Vol. I, pp.11-12

measured accurately what explorers had reported inaccurately'.¹⁰ Renan Silva contends, similarly, that the 'ilustrados' of New Granada assigned great importance to their instruments.

[They] maintained a close and intense relationship with them, not only because they acquired an important selection of instruments of high quality for their era, and because they were instrument makers, but because they appreciated them highly...and because they produced a theoretical reflection around them, as well as writing many texts about their use'.¹¹

The French explorer Francis de Castelnau clearly enunciated the relationship between instruments and scientific status in the introduction to his work *Expédition dans les Parties Centrales de l'Amérique de Sud* (1850), when he listed the apparatus that had facilitated his research. Castelnau's list, which spanned two pages, included 'a theodolite by Gambey...three barometers by Ernst, with twenty spare tubes, two meteorological thermometers, made under the direction of M. Babinet, an instrument to measure the direction and intensity of the wind...some hygrometers of Saussure and Auguste...some prisms, a microscope, a galvanic battery, a daguerreotype, many small portable compasses...[and] a cephalometer'. The Frenchman also equipped himself with 'a large number of vessels, destined to contain animals in alcohol, plaster

¹⁰ Susan Faye Cannon, 'Humboldtian Science' in *Science in Culture: The Early Victorian Period*, New York, Science History Publications, 1978, p.75

¹¹ Silva, *Los Ilustrados*, p.490. Mauricio Nieto also discusses the importance of precision instruments in scientific work in his analysis of the *Semanario del Reino de Nueva Granada*. Nieto argues that 'the comprehension of the world, more than a conceptual problem, is a technical problem, and scientific instruments are as necessary for [an individual] to be able to form part of the community of the natural sciences as are interlocutors and bibliographical references'. See Mauricio Nieto Olarte, *Orden Natural y Orden Social*, p.99

to make moulds, boxes of scalpels to prepare mammals and birds, many pots of arsenic powder...[and] an enormous quantity of paper for drying plants'.¹²

Assembling this armoury of equipment necessarily took time and money, and it tested the patience of the Minister supervising the project, Monsieur Villemain, who had, prior to this point, organised only 'philological and artistic voyages'. Obligated to justify the sluggish pace of his preparations, Castelnau expatiated on the differences between a scientific expedition of the type he was undertaking and the artistic voyages that the Minister was accustomed to supervising. He summarised the distinctive qualities of the naturalist's work and emphasised the necessity of having the correct equipment with which to conduct it. 'The poet or the author, charged with a mission in Italy or in Greece, needs no more than an album in which to record the inspirations of his spirit and the results of his observations', meditated Castelnau, whilst 'the archaeologist sent to the Orient contents himself with the objects necessary for measuring and reproducing their monuments'. The scientific traveller, by contrast, required copious equipment, extensive training and precision instruments constructed by the most skilled craftsmen if he were to complete his mission with success. 'For [such an expedition] the personnel must include men in a state to follow the different observations in branches [of science] as varied as astronomy, global physics and the natural sciences', stipulated Castelnau, 'and the baggage will be composed of numerous instruments, the delicacy of which is such that, in spite of the greatest care, at least a part will certainly deteriorate during the course of the voyage, making it necessary, in consequence, to carry two or three copies of the principle instruments'.¹³

¹² Francis de Castelnau, *Expédition dans les Parties Centrales de l'Amérique du Sud de Rio de Janeiro à Lima au Para, Exécutée par Ordre du Gouvernement Français pendant les Années 1843-1847, sous la Direction de Francis de Castelnau. Histoire du Voyage, Vol. I, Paris, Imprimerie de L. Martinet, 1850, p.17*

¹³ *Ibid.*, pp.12-13

Slow and meticulous preparations were thus essential for the effective study of the natural world.

Spanish and Spanish American naturalists also defined themselves at least in part by their possession of precision instruments and specialist equipment. A list of 'the books, instruments and utensils' that were supplied to the botanists Hipólito Ruíz and José Pavón for their expedition to Peru included 'a very exact barometer, constructed in Paris', 'two of Monsieur Réamur's thermometers in their boxes, both of which have been compared and tested', 'three lenses or magnifying glasses for the observation of the smallest parts of plants', several 'chemical preparations' for analysing the contents of the local water and a liberal selection of scientific works for instruction and reference.¹⁴ Three portraits of José Celestino Mutis likewise reference the scientific equipment that facilitated his study of New Granada's flora. In one portrait, the naturalist scrutinises a delicate flower with the aid of a magnifying glass; in another he poses before a microscope; and in third the bust of Mutis appears surrounded by the instruments that epitomised his profession – a globe, some compasses and a microscope. Such details attest the value of scientific instruments, both practically in ensuring accurate measurements and observations, and aesthetically, in certifying the professionalism of their users.

¹⁴ 'Lista de libros, instrumentos y utensilios que se han suministrado en virtud de orden de S.M. de 24 de Marzo de este año a los Botánicos que pasan al Perú', in *Hipólito Ruíz, Relación*, p. 403



Fig. 1: Don José Celestino Mutis studying the *Mutisia* and the *Canelo de Andaquies*, by C.A. Machado. In José Celestino Mutis, *Flora de la Real Expedición del Nuevo Reino de Granada*, Madrid, Ediciones Cultura Hispánica, 1954, Vol. I, opening page



Fig.2: José Celestino Mutis. Portrait by Salvador Rizo, 1787, from Juan Pimental, *Viajeros Científicos: Tres Grandes Expediciones al Nuevo Mundo*, Madrid, Nivola, 2001, p.91

The letters and articles written by the New Granadan savant Francisco José de Caldas evidence an even more intense relationship with his scientific instruments. As we saw in chapter 4, Caldas' correspondence was full of references to equipment that he required, coveted, or had recently received, and the creole seems to have based his professional authority to a large extent upon the apparatus he possessed. In one letter Caldas related how he embarked upon an expedition 'armed with my barometer, thermometer, octant [and] compass'.¹⁵ On another occasion, describing his recent attempts at dissection, the New Granadan proclaimed that 'my desire to instruct myself has put the knife in my hands, and I have forgotten the telescope and the octant'.¹⁶ In a third letter, meanwhile, Caldas expressed his regret at having omitted to bring some of his instruments during an excursion in the company of Bonpland. 'It is mortal the pain that I feel at not having bought with me my microscope and my octant', sighed the creole melodramatically, indicating the high value he attached to these objects and their importance to his scientific standing.¹⁷

Martyrs to Science

Eighteenth and nineteenth-century naturalists founded their professional identity not only on their possession of precision instruments, but also on their heroism and dedication. They portrayed themselves as martyrs to science, who risked their lives in pursuit of knowledge, and they proudly touted their sufferings as evidence of their scholarly ardour and masculine valour. Mary Terrall argues that eighteenth-century savants glorified their discoveries with repeated references to their physical heroism,

¹⁵ Letter from Caldas to Mutis, 23 September 1802, in Chenu, *Caldas*, p.188

¹⁶ Francisco José de Caldas, 'Memoria sobre el plan de un viaje proyectado de Quito a la América septentrional, presentada al célebre director de la Expedición Botánica de la Nueva Granada', in *Obras*, p.313

¹⁷ Letter from Caldas to Antonio Arboleda, 21 January 1802, in Chenu, *Caldas*, p.152

drawing parallels with valiant soldiers and classical heroes and describing ‘a kind of focused exploration of nature that combined physical effort and daring with mathematical and instrumental power’.¹⁸ Analysing the writings of Alexander von Humboldt, Oliver Lubrich observes, similarly, how the many bodily ills that afflicted Humboldt over the course of his five-year voyage to South America ‘legitimated the seriousness of his enterprise’. They differentiated his ‘voyage of research from the aristocratic grand tour’ and showcased his physical as well as his intellectual powers.¹⁹

The naturalist endured many physical privations in pursuit of his profession. He clambered up treacherous mountains and volcanoes to collect plants and geological samples. He trekked for miles in remorseless heat or withering cold to observe an elusive animal. He forfeited sleep so that he could classify his specimens and complete his notes and calculations and he jeopardised his health, his comfort and even his life in his quest to further human knowledge. Biographers – or, in the worst-case scenario, obituary writers – detailed frequently how a naturalist’s passion for knowledge had tempted him into situations that ultimately cost him his life. More than one equated the work of the scientist explicitly with hardship, self-deprivation and an early grave, and several described in harrowing detail how an altruistic impulse to decipher nature’s wonders had been brutally extinguished by a fatal illness or murderous natives. Castelnau’s travelling companion Eugène d’Osery, for example, ‘fell victim to his zeal for science’, when he was murdered by his Peruvian guides en route to Lima, depriving his companions of ‘a great part of the scientific results of the

¹⁸ Mary Terrall, ‘Heroic Narratives of Quest and Discovery’, *Configurations* 6.2, John Hopkins University Press, 1998, p.224

¹⁹ Oliver Lubrich, ‘Dolores, Enfermedades y Metáforas Poéticas del Cuerpo en Alejandro de Humboldt’, *Revista de Indias*, 2004, p.506

expedition' as well as his noble person.²⁰ The French chemist Jean Baptiste de Boussingault, meanwhile, related the sad fate of a young Swedish naturalist, who expired prematurely in the sweltering heat of the river Magdalena. 'In the slim baggage of this *victim of science* there were some dried plants and a miniature [portrait] of a charming young girl, his sister or his fiancée', reported Boussingault, 'plus – that which I cannot forget – a little dog that could only with difficulty be detached from the corpse of its master, and whose howls provoked tears'.²¹

Spanish naturalists also employed the rhetoric of the self-sacrificing savant. A good example appears in a letter from José Celestino Mutis to the Spanish King Charles III, in which the botanist petitioned his monarch to authorise a Botanical Expedition in New Granada. Mutis began by sketching the potential benefits of such an expedition. He then enumerated the many hardships that it would entail, and the dedication and fortitude necessary to endure them. 'A traveller must spend a large part of the night ordering and arranging that which he collected in the day', stipulated Mutis. He must also contend with 'the roughness and precipices of the ground he is charting, the discomforts of insufferable insects that surround him on all sides; the frights and dangers of many poisonous and terrible animals that alarm him at every step' and a testing climate that 'breaks and fatigues his body'. Mutis considered himself equal to these trials and implored Charles to appoint him as leader of the proposed expedition. 'The unspeakable discomforts that the laborious study of nature brings with it do not horrify me', the Spaniard declared stoically.²²

²⁰ Castelnau, *Expédition*, p.16

²¹ Boussingault, *Mémoires*, Vol. IV, p.24. (my italics)

²² Mutis, *Flora*, Vol. I, p.58

The image of the self-sacrificing savant surfaces with equal potency in two brief biographies of Antonio Pineda, chief naturalist aboard the Malaspina Expedition. An article in the *Memorial Literario, Instructivo y Curioso de Madrid* extolled Pineda's 'zeal' in the study of nature, describing how this industrious savant would 'go in search of Natural History objects, penetrating mountains and forests and inspecting volcanoes and mines, without considering the risks or providing himself with the breaks necessary to restore his energy and health in such varied climates and temperatures'.²³ A homage to Pineda in the *Mercurio Peruano* conjured a similarly reverential portrait. It related how Pineda scrambled up smouldering volcanoes, where he risked being 'suffocated by smoke and ashes'.²⁴ It also dramatised Pineda's personal privations during the expedition, suggesting that he adhered to a strict study regime and economised on sleep and eating in order to cram more work into his day. Pineda 'regulated the hours of his life in accordance with his occupations', rhapsodised the article's author, 'and since these were continuous, he scarcely had any destined for rest or eating. He slept and ate with austerity, and only when he was compelled to do so out of necessity'.²⁵

When Pineda succumbed to a debilitating fever whilst exploring the Isle of Luzon in the Philippines, his distraught biographers mourned him as 'a martyr to the study of nature'.²⁶ They sentimentalised his final moments and cast him as a fallen military hero or an expiring saint. A sketch of Pineda's death scene by one of his travelling companions José de Vasquéz, for example, depicts the dying savant lolling

²³ 'Historia Natural. Premio Real del Mérito Literario', *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, May 1795, Madrid, Imprenta Real, pp.161-162

²⁴ Unanue, *Elogio histórico del señor Don Antonio de Pineda*, p.9

²⁵ *Ibid.*, p.12

²⁶ *Ibid.*, p.12

feebly on a bench, attended by a concerned priest and surrounded by hand-wringing natives (Fig. 4) – a composition reminiscent of the famous death scene of General Wolfe (Fig. 5), and suggesting similar valour and heroism. The posthumous article in the *Mercurio Peruano*, meanwhile, lingered over the religious propriety of Pineda's sad demise, noting how the dying savant, though delirious for the last three days of his life, regained consciousness for long enough to murmur his devotion to God and receive the last rites like a good Catholic. 'Deprived suddenly of all of his senses he remained in an apoplectic state for three days' stated the article. But 'on the third his tear-filled eyes were seen to fix themselves on a crucifix and he denoted with his hand that he was dying in the august and holy religion in which he had lived'.²⁷



Fig. 4: Death of Antonio Pineda in Luzón, Philippines. Engraving by José Vázquez, 1795, in Iris Wilson Engstrand, *Spanish Scientists in the New World: The Eighteenth-Century Expeditions*, Seattle, University of Washington Press, 1981, p.66

²⁷ Ibid., p.10



Fig. 5: The Death of General Wolfe, Benjamin West, 1770

Whilst scientific suffering was most readily associated with the perils of fieldwork, it also encompassed the equally gruelling aspects of research performed within the apparent security of the study. It included the hours spent hunched over a microscope examining a delicate insect and the sleepless nights spent preparing specimens and summarising observations. It even included the real bodily pain inflicted during dangerous experiments.

The French ornithologist Sonnini de Manoncour paraded this type of intellectual bravery when he translated Azara's notes on the birds of Paraguay (see chapter 4). Describing a bird of prey that Azara had classified as the 'brown eagle', Sonnini expatiated on the painstaking researches he had had to undertake in order to determine whether this animal did indeed constitute a new species. He detailed the complex and time-consuming process of trawling through the existing literature in search of references to this bird, and he celebrated the silent heroism of the sedentary

naturalist, who wrestled with challenging scientific questions in the less glamorous setting of his study. 'How much attention have I brought to comparing the descriptions made by M. Azara with those of the ornithologists who have preceded him!' sighed Sonnini. 'How much time have I employed, how much courage have I put into a job that is both arid and fastidious!'²⁸

The Uruguayan naturalist Larrañaga conjured a similar image of scholarly suffering in a letter to Aimé Bonpland, in which he alluded to the discipline and exertion required to formulate some notes on the local fauna for the Frenchman's perusal. The Uruguayan recounted how he had forfeited sleep to complete his work, finishing his notes 'at the cost of several hours destined for natural repose'. He meditated on the diligence and rigour currently expected of the serious naturalist and he dramatised these hardships in the same brutal language employed by the scientific explorer. 'You cannot imagine the violence that I have had to do to myself in order to address things that I had abandoned', whimpered Larrañaga, 'and which demand time, tranquillity and meditation, and sometimes a patience more than stoic, in order to provide all the details that naturalists now enter into'.²⁹

Perhaps most dramatic of all were the sufferings endured by the Prussian savant Alexander von Humboldt, who not only roamed hazardous terrain, but also mutilated his own body in the name of science. Before he travelled to South America in 1799, Humboldt had tested Galvani's theories of electricity by applying 'two heterogeneous metals...to wounds which I had made on my back by means of

²⁸ Azara, *Voyages*, Vol. III, p.45

²⁹ Letter from Dámaso Antonio Larrañaga to Aimé Bonpland, 25 May 1818, in Gallinal, Vol. III, p.268. The Spanish botanist Mutis, painted a similar picture of scientific dedication when he detailed the working conditions of his American artists, reporting that his botanical painters worked for nine hours every day in quasi-monastic silence, where 'every official, attentive to his labour, listens only to the voice of the Director'. See 'Informe de José Celestino Mutis sobre los Pintores, Mariquita, 3 de Enero de 1789' in *Flora de la Real Expedición del Nuevo Reino de Granada*, p.125

cantharides', an experiment that engendered a 'painful twitching' sensation.³⁰ In Venezuela, the Prussian and his companion Bonpland repeated these experiments with electric eels (gymnoti) captured in the llanos, prodding the fish in order to provoke a reaction and using their own bodies to register the effects of their electrical discharge. The resulting shocks were often excruciatingly painful, yet the travellers persevered with their researches, evidencing what Lubrich classes as a form of 'scientific masochism'.³¹ Humboldt described, for instance, how in one particularly intensive session with the eels, he and Bonpland 'made experiments successively for more than four hours with gymnoti', experiencing 'till the next day a debility in the muscles, a pain in the joints and a general uneasiness, the effect of a strong irritation on the nervous system'. The creole Caldas admired such dedication, and likened it specifically to a form of martyrdom.³² 'You sacrifice yourself for the progress of the sciences and do things that we can scarcely believe', effused the creole in a letter to the Baron. 'It seems to me that we may with justice add to the glorious title of voluntary Martyr to galvanism that of voluntary Martyr to human knowledge'.³³

Whilst physical stamina and a high pain threshold were thus important to the self-fashioning of the naturalist, personal austerity, moral integrity, and private virtue played an equally significant part in this professional identity. Men of science continually emphasised that their primary motivation was not the acquisition of personal wealth, but the altruistic accumulation of human knowledge. They embraced

³⁰ Alexander von Humboldt, *Travels to the Equinoctial Regions of America during the years 1799-1804*, ed. Thomasina Ross, London, George Bell and Sons, 1889, Vol. II, p.119

³¹ Lubrich, 'Dolores, Enfermedades y Metáforas', p.509

³² Humboldt, *Travels*, Vol. II, p.119

³³ Letter from Caldas to Humboldt, 17 November 1802, Chenu, *Caldas*, p.201

a missionary-like poverty and renounced worldly riches in pursuit of a higher intellectual goal.

The image of the austere, virtuous savant surfaces in a biographical sketch of Mutis, written posthumously by his nephew Sinforoso. Reacting to the unflattering stereotype of the avaricious gold-hunting Spaniard, the younger Mutis protested adamantly that his uncle did not travel to the New World 'in order to enrich himself'. 'He was not one of those Spanish adventurers who come to our America in order to make their fortune', asserted Sinforoso, but 'had no other object in coming to America than to collect the rich productions of this precious portion of the monarchy, visited rapidly by Feuillée, Plumier, Loeffling and a few other botanists'.³⁴

A similar attempt to separate scientific enquiry from monetary gain surfaces in Gómez Ortega's instructions to Ruíz and Pavón prior to their departure for Peru. In instruction number eighteen, Ortega expressly prohibited the Spanish botanists from engaging in any form of trade during the course of their expedition. He declared that this activity was incompatible with the noble aims of their voyage and pointed out that his proscription of commerce extended to items of natural history, which were not to be exchanged for money in America or remitted to collectors back in Europe. 'Neither for themselves, nor on behalf of any other person may they mix themselves in matters of commerce', stipulated Ortega. Any transgression of this nature would, he assured the botanists, be severely punished, for 'this being a purely scholarly voyage and

³⁴ Sinforoso Mutis, 'Historia de los Arboles de Quina. Obra Póstuma del D. José Celestino Mutis, célebre naturalista y patriarca de los Botánicos, Director de la Real Expedición Botánica del Nuevo Reino de Granada, Socio de diferentes Academias de Europa y Astrónomo de S.M. Concluida y arreglada por D. Sinforoso Mutis y Consuegra, Individuo de la misma Real Expedición Botánica, y nombrado para organizar y publicar la Flora de Bogotá. Año de 1809, *Flora*, p.112

commission, neither the Spanish Professor, nor Mr. Dombey, who is accompanying them, must depart from the study...to which they should confine themselves'.³⁵

In practice, of course, the boundaries between science and commerce were never that clear, and more than one savant tarnished the good name of his profession by engaging in base pecuniary transactions – Potowski being a case in point. The conscious attempt made by contemporaries to distinguish the ‘scholarly voyage’ from less noble enterprises suggests, nevertheless, at least an intention to separate learning from monetary gain, and it may have had a particular resonance in the Hispanic world, where the lust for precious metals was often perceived as the prime motivation for exploration. Sinforoso Mutis thus explicitly distanced his uncle from ‘those Spanish adventurers who come to our America in order to make their fortune’, by which he may have meant either the sixteenth-century conquistadors who plundered the New World for its gold and silver or more recent Spanish immigrants, who viewed the continent as a place to get rich quick. The New Granadan Caldas likewise denied emphatically that personal enrichment was the impetus for his studies. ‘My heart had never known the desire for gold and silver, until I felt its need in order to become learned’, exclaimed Caldas, who clearly viewed money as the catalyst for enlightenment, but not as an end in itself.³⁶

If such professions of personal austerity evoke parallels with the overseas missionary, then some biographers went even further. They suggested that the scientific martyr shared not only his poverty with the missionary, but also his

³⁵ Casimiro Gómez Ortega, ‘Instrucción a que deberán arreglarse los sujetos destinados por S.M. para pasar en la América Meridional, en compañía del Médico don Joseph Dombey, a fin de reconocer las plantas y yerbas y de hacer observaciones botánicas en aquellas partes’, in Hipólito Ruiz, *Relación histórica*, Vol. I, pp.400-401

³⁶ Letter from Caldas to Santiago Pérez Arroyo, 21 January 1802, in Chenu, *Caldas*, p.144

celibacy. They portrayed the naturalist as married to his vocation, channelling all of his passion into the tireless pursuit of knowledge.

A perfect example of the celibate savant was Azara. Introducing his French translation of the Spaniard's *Apuntamientos sobre los Cuadrúpedos de Paraguay*, Moreau-Saint-Méry sketched a succinct portrait of Azara's life, in which he felt it necessary to comment upon the author's bachelorhood. Moreau-Saint-Méry declared that he would not 'moralise on the advantages and disadvantages of this state'. The Frenchman speculated, nevertheless, that 'if [Azara's] passion for researching the marvels of nature did not originate from the type of independence that is a consequence of celibacy, then at least that passion has not been enfeebled by the cares and sweet pleasures that would have gone to a wife'. He hypothesised that natural history functioned as a form of surrogate spouse for Azara, easing his solitude and exercising his brain in the absence of human companionship.³⁷

Another naturalist who forfeited female company for scientific excellence was Antonio de Pineda. In his *Elogio*, Unanue stated explicitly that Pineda exhibited scant interest in frivolous social interactions, highlighting in particular the Spaniard's disdain for female company. 'Though a soldier and a musician, [Pineda] had little aptitude for common conversations', reflected Unanue. 'A bird, a plant, etc., that presented itself to his eyes wrenched him from the greatest tenderness and made him forget the many charms offered by the fairer sex'. Unanue intimated that Pineda, like Azara, was married first and foremost to his work. He also insinuated that women were an unwelcome distraction from more serious studies – a point reinforced by his

³⁷ Azara, p.xxxv

choice of the word 'hechizos' or 'charms', which derives from the verb 'hechizar', to 'enchant' or 'bewitch'.³⁸

Women, of course, *did* participate in natural history, and were indeed encouraged to do so. The Spaniard José Clavijo y Fajardo opened his translation of Buffon's *Histoire Naturelle* with the claim that 'there was not class *or* sex to which [the study of nature] is not suited, for since all share to some extent in the gifts that the Creator has scattered with such liberality, to neglect to know about them, when there is a means of doing so, would be to give signs of stupidity or of negligence'.³⁹ The September 1784 issue of the *Mercurio Literario*, meanwhile, reported the presence of upper class women at the botanical exercises that Gómez Ortega had recently choreographed at the Real Jardín Botánico. According to the article, 'these lessons have been frequented in the present month not only by some of the students from the previous course, but also by various curious individuals and distinguished persons *of both sexes*', all of whom had the pleasure of seeing Gómez Ortega exhibit and describe a number of plants with medicinal uses, 'particularly those which, flowering only in this season, could not be explained usefully during the previous courses in spring and summer'.⁴⁰

Whilst women thus engaged in natural history at one level, however, they rarely qualified for the title of 'martyr to science'. When females nurtured their passion for the study of nature by perusing popular textbooks or pressing pretty flowers, they usually did so in the comfort of their homes, and for the development of their own minds, rather than the furtherance of human knowledge (this, at least, was

³⁸ Unanue, *Elogio*, p.12

³⁹ Clavijo-Fajardo, *Historia Natural*, Vol. I, p.lxvi

⁴⁰ 'Real Jardín Botánico', *Memorial Literario, Instructivo y Curioso de la Corte de Madrid*, September 1784, Madrid, Imprenta Real, 1784, p.8

how their activities were typically portrayed). When, conversely, women *did* undertake long and arduous journeys through tortuous terrain, then their motivation for doing so was seldom presented as being the impersonal and altruistic pursuit of knowledge, but usually the very personal pursuit of a child, husband or lover, as was the case with the celebrated Ecuadorian woman Isabelle Godin des Odonais, who embarked upon a perilous trek from Quito to Cayenne in 1769 in order to rejoin her husband, the French académicien Jean. The one major exception to this rule was the Prussian entomologist Maria Sibylla Merian, who travelled to Surinam in 1699 to collect insects and study their metamorphosis, yet she seems to have been something of an anomaly. According to Londa Schiebinger, 'Merian was the only European woman who voyaged exclusively in pursuit of her science in the seventeenth or eighteenth centuries', and her daring exploits differed sharply from the more sedate activities of other female naturalists, who usually contented themselves with the natural productions of their local area or, if they travelled, did so in the company of their husbands.⁴¹

A more typical snapshot of the niche envisioned for women in the study of natural history appears in the Spanish periodical *Varietades* in Juan Blasco Negrillo's article 'De lo que debe entenderse por Historia Natural, de los diferentes ramos que abraza, y de las utilidades que pueden sacarse de su cultivo y estudio'. Negrillo postponed his comments on the benefits that natural history might offer to women until the penultimate paragraph of his article. When he did address female involvement in the study of nature, he presented it more as a pleasant pastime than as an all-consuming career, emphasising the irrational fears that women might exercise as well as the moral lessons they might imbibe.

⁴¹ Schiebinger, *Plants and Empire*, p.30

If the beautiful sex were to dedicate its many free moments to acquiring knowledge in this science; if it were to merit the same attention from them [as other forms of entertainment], and if a drawing, a piece of embroidery or a sheet of music were to alternate in their hands with a pretty flower, a gracious animal or a strange little insect: what fears, frights and disgusts might be avoided! With what tranquillity and even curiosity would they see halt a harmless snake [culebra] that previously horrified them, or an innocent spider that would have made them jump!⁴²

Negrillo, as this quotation makes clear, conceived of natural history as an instructive form of amusement for upper class women with time on their hands. He did not envisage Spanish ladies penetrating jungles, braving mosquitoes or confronting vicious beasts in their quest for knowledge, and he stipulated, on the contrary, that feminine engagement with the natural world be confined to all that was benign, entertaining or aesthetically pleasing – note the ‘pretty flower’, the ‘gracious animal’ the diminutive ‘insectillo’ and the non-venomous ‘culebra’, as opposed to the venomous ‘serpiente’. This charming prescription for rational recreation contrasts sharply with the travel accounts of male naturalists, which routinely sensationalised the grandeur, danger and hostility of the natural world they sought to conquer, and revelled in the physical and moral tenacity of their authors. Caldas, for instance, explicitly celebrated his masculine stamina in a letter to Mutis, when, having ascended Mount Pichincha in the company of Humboldt and Bonpland, he described his ‘satisfaction in having shown the Baron that I was not a woman [dama], and that I knew how to scale the most terrible mountains’.⁴³

⁴² Juan Blasco Negrillo, ‘Historia Natural’, p.41

⁴³ Letter from Caldas to Mutis, 21 June 1802, in Academia Colombiana de Ciencias Exactas, Físicas y Naturales (ed.), *Cartas de Caldas*, Bogotá, 1979, p.183

Savants or Savages?

Where did indigenous people fit into this picture? Could they also qualify as professional naturalists, or did they fall short of these stringent moral, physical and intellectual criteria?

Indigenous people often served naturalists as guides and collectors. They shepherded scientific travellers through unfamiliar terrain. They lugged their cumbersome equipment from place to place, and they were sometimes entrusted with gathering and even preparing coveted specimens, in the belief that they, as natives of the locality, knew best where to find them and how to procure them. The British traveller William Bullock related how he acquired many 'curious birds' from an Indian market in Mexico City.⁴⁴ The Spaniard Félix de Azara likewise relied on remissions of specimens from Paraguay's Indian population, and he transcribed their observations on the behaviour of certain local species. Describing a type of otter, for example, Azara deferred to the testimony of 'the barbarous Payaguas, who navigate the River Paraguay and know this animal better than anyone'. He accepted their claims that this creature gave birth to two cubs each year, that it lived in a burrow beside the river and that its flesh was inedible.⁴⁵

Enslaved Africans also participated in the collection of natural historical objects, especially in Brazil, where the white elite routinely delegated all forms of manual labour to their black slaves. Mary Karasch has observed how Africans trained to hunt animals for the culinary pleasure of their masters quickly made the transition

⁴⁴ William Bullock, *Six Months' Residence*, p.191

⁴⁵ Azara, *Quadrupedos*, Vol. I, p.328

to collectors of zoological specimens, becoming, in effect ‘Brazil’s first naturalists’.⁴⁶ The British traveller D.P. Kidder pictured one of these slave collectors in action in his *Sketches of Residence and Travel in Brazil* (1845), as he sauntered through a tropical landscape, a large satchel slung over his shoulder and a butterfly net in one hand (Fig.6), whilst the British humming bird expert John Gould reported that ‘the residents of many parts of Brazil employ their slaves in collecting, skinning and preserving [these birds] for the European market’, as a result of which ‘many thousands are annually sent from Rio de Janeiro, Bahia and Pernambuco’.⁴⁷



Fig. 6: A Brazilian slave collecting natural history specimens for his master, as depicted by D.P. Kidder in *Sketches of Residence and Travel in Brazil*, Philadelphia, 1845. From George Basalla, ‘The Spread of Western Science’, *Science*, vol. 156, 1967, p.619.

⁴⁶ Mary Karasch, ‘Suppliers, Sellers, Servants and Slaves’ in *Cities and Society in Colonial Latin America*, ed. Louisa Schell Hoberman and Susan Migden Socolow, Albuquerque, University of New Mexico Press, 1985, p.258

⁴⁷ John Gould, *A Monograph of the Trochilidae or Family of Humming Birds*, London, Taylor and Francis, 1861, Vol. I, p.xi

Some indigenous people, as Gould's comment suggests, also mastered the complex art of taxidermy, earning praise from European naturalists. The Spanish botanist Martin Sessé commended the handiwork of one taxidermist named Mateo Sánchez, 'an Indian of singular dexterity and inestimable value for restoration and conservation, in which branch Ornithologists have worked unproductively',⁴⁸ whilst Juan Mieg marvelled at the creations of some merchants in natural history artefacts who falsified specimens by severing tails, removing ears and extracting teeth. Mieg specified that 'this art of forming new species of animals is not practised only in Europe', for 'many Indians use it with an admirable perfection', and he went on to detail a method employed by 'the Americans' – presumably the Indians – to change the colour of parrot feathers, a technique that involved plucking the bird's tail feathers and dipping the resulting stumps in the blood of a certain species of frog.⁴⁹ As a naturalist Mieg obviously disapproved of their deception and found it an inconvenience, but he could not suppress his admiration for their skill and dexterity.

In addition to performing invaluable manual tasks, Amerindians and Africans supplied indispensable information about the uses and properties of indigenous plants. European and creole men of science frequently consulted native healers about the pharmaceutical virtues of local herbs. They deferred to their greater experience in fields such as toxicology, and they often extracted vital details about poisons and their antidotes from indigenous guides and accomplices.

The Ecuadorian Velasco described how he had learned of a remedy for snake venom from an African slave. The individual in question was 'famous for his ability to catch the most venomous and terrible serpents and play with them, wrapping them

⁴⁸ Iris Wilson Engstrand, *Spanish Scientists in the New World: The Eighteenth-Century Expeditions*, Seattle, University of Washington Press, 1981, p.145

⁴⁹ Mieg, *Paseo*, p.102

around his neck, his arms and his legs and putting them on his chest, without receiving the least injury', and Velasco coaxed him to reveal his secret, which turned out to be the ingestion of a certain herb. 'He told me that the cure consisted of depriving oneself of all oily...food for forty days, whilst drinking daily the pulp of a certain herb with its roots', stated Velasco, who had made the slave 'great promises if he were to reveal his secret to me'.⁵⁰

Caldas narrated a similar incident in an essay on the effects of climate on living things. The creole detailed in a footnote how he had explored the jungles around Bogotá in the company of a Noanama Indian 'famous in the art of curing serpent bites', and he recalled how his companion had constantly reassured him, promising to come to his aid if he were bitten. Anxious to discover the Indian's secret remedy, Caldas sought to secure the man's friendship by 'flattering his passion for [alcoholic] drink' and 'giving him presents'. The creole eventually persuaded his guide to disclose his secret, which he did by showing him a tree branch and whispering that 'this is a good *contra*', and Caldas described how the Indian divulged other 'contras' over the course of their journey, each of which he scrutinised with care 'observing it, fixing the genus, drawing and describing the species'. Whilst the creole was impressed at the sheer number of antidotes known to the Noanama, what truly surprised him was the fact that all of these medicinal herbs belonged to the same Linnaean family. 'What I admired, and what attracted all of my attention, was that all the plants that he presented to me as effective against the bites of snakes were of a single genus: all were *beslerias*', stated Caldas. 'Experience, repeated use, a happy accident must surely have taught the inhabitants of the countries in which snakes abound that this plant is a powerful remedy', and 'necessity, the most imperious of all

⁵⁰ Velasco, *Historia del Reino de Quito*, Vol. I, p.116

laws, will have compelled them to search for a substitute in those cases when the known herb is not available'.⁵¹

As the above examples indicate, native peoples were indispensable to study of natural history. They were, however, rarely recognised as 'naturalists' by their fellow scholars. This was partly because they served in subordinate roles, as guides, porters or taxidermists, where sensory acuity, experience and manual dexterity were more important than mental agility or theoretical adeptness. It was partly because the information they supplied was largely empirical in character, and the product of chance or necessity. And it was partly because Indians, as both curiosities and curious subjects, were seen as lacking 'the proper epistemological distance between observer and the observed'.⁵² This slippery identity is exemplified all too clearly by a Botocudo Indian owned by the Prussian Consul General in Rio, M. Von Langsdorff, who, according to the naturalist Johannes von Spix, 'served him not only as a living cabinet piece, but as a collector of objects of natural history', assuming the dual role of collector and specimen.⁵³

One facet that excluded indigenous people from the noble persona of the 'naturalist' was their tendency to work in exchange for money. Men of science, as we have seen, were supposedly spurred to study nature's wonders by an insatiable thirst for learning. Africans and Amerindians, by contrast, only participated in such scholarly enterprises under duress, or once their palms had been greased, and they refused to put in long hours of work without sufficient remuneration. William Bullock

⁵¹ Francisco José de Caldas, 'Del Inlujo del Clima Sobre los Seres Organizados', in *Obras*, pp.98-99

⁵² Susan Scott Parrish remarks, for example, that where 'colonials could collapse the distance between self and specimen through affective or metaphoric language in a performance of curious sensibility or wit...Indians apparently had no such divide to cross between native and nature'. See Scott Parish, *American Curiosity*, p.230

⁵³ Johann Baptista Von Spix, and Carl Friedrich Von Martius, *Travels in Brazil in the Years 1817-1820. Undertaken by Command of His Majesty the King of Bavaria*, London, 1824, Vol. I, p.143

thus described his Indian specimen collectors as being 'in my pay'.⁵⁴ A weakness for alcohol tempted Caldas' Noanama guide to reveal his pharmaceutical secret, whilst Gould's Indian humming bird hunters only 'traverse[d] great distances for the purpose of procuring [these creatures]' because 'a certain amount of emolument attends the collecting of these objects'.⁵⁵

The 'non-scientific' motivation of many indigenous people also detracted from their scholarly reputation and sometimes compromised the scientific value of their contributions. Velasco's African snake tamer, for example, bought the remedy for snakebites from another slave so that he might 'play' with these venomous serpents – not so that he could subject them to a rigorous anatomical examination. Bullock expressed his disappointment that many of the specimens he found in the Indian market were unfit for ornithological study, since 'most of them were partially plucked and many were brought without their feet'⁵⁶ – essential for accurate Linnaean classification – whilst Mieg's Indian fraudsters clearly subordinated scientific precision to pecuniary gain. The author of *Paseo* dutifully alerted visitors to the Real Gabinete to the dangers posed by 'fictitious monsters', so that they might expose such deceptions in future, and he also debunked the mistaken belief that birds of paradise had no feet - an error that originated from the Indians' practice of cutting off these appendages before sending them to Europe in order to insert them more easily into boxes.⁵⁷

⁵⁴ Bullock, *Six Months' Residence*, p.191

⁵⁵ Gould, *Trochilidae*, p.xi

⁵⁶ Bullock, *Six Months' Residence*, pp.191-192

⁵⁷ Mieg, *Paseo*, p.29

As well as working primarily in exchange for payment, indigenous people often exhibited an apparent cowardice and aversion to physical pain that likewise disqualified them from the denomination of 'naturalist'. European naturalists, as we have seen, made a professional virtue out of their heroism and endurance. Native guides and assistants, by contrast, were usually perceived to be lacking in these qualities, often inviting ridicule for their 'irrational' fears or slothful dispositions.

Humboldt espoused this view on several occasions in his *Personal Narrative*. Describing the difficulties he experienced in obtaining electric eels for one of his experiments, the Prussian chided uncooperative locals, who refused to help him in the trapping of these fish because they feared their painful stings. Humboldt grumbled that 'the dread of the shocks caused by the gymnoti is so great and so exaggerated among the common people that during three days we could not obtain one, though they are easily enough caught, and we promised the Indians two piastres for every strong and vigorous fish'. The Baron implicitly juxtaposed his own stoicism with the seeming pusillanimity of the natives, and he regretted that not even the prospect of a substantial monetary reward could induce the latter to risk bodily discomfort. 'Money loses its value as you withdraw from the coast', sighed Humboldt, 'and how is the imperturbable apathy of the ignorant people to be vanquished when they are not excited by the desire of gain?'⁵⁸

Later in the same travel account Humboldt furnished another example of native feebleness. The culprit on this occasion was an Indian guide, whom Humboldt and Bonpland had enlisted to direct them to the Venezuelan village of Maniquarez, and the Prussian detailed with impatience how this man, though clearly fit and healthy, rapidly lost interest in the expedition, beginning 'to sit down at every

⁵⁸ Humboldt, *Travels*, Vol. II, pp.112-113

moment' and wishing 'at length, to repose under the shade of a fine tamarind tree near Casas de la Vela, to await the approach of night'. Humboldt surmised from this pantomime that the Indian's heart was not in the excursion. He did not infer that his guide was physically weak – as Buffon and others had done – for he was well aware that 'the same Indian who would complain when in herborising we loaded him with a box full of plants would row his canoe fourteen or fifteen hours together, against the strongest current, because he wished to return to his family'. Humboldt *did* conclude, however, that the Indian was unwilling to exert himself in the interest of science – a characteristic that evidently exempted him from the romantic persona of the suffering savant.⁵⁹

Another sin of which indigenous people frequently stood accused was apathy. Africans and Amerindians were often believed to lack the spirit of enquiry that impelled Europeans to explore and study the natural world, and their apparent obliviousness to striking panoramas or romantic ruins convinced some commentators that they lacked the white man's curiosity and sense of adventure. David Arnold describes, for example, how the seeming indifference of local people to the charms of the Himalayan landscape persuaded British colonists that 'the Indians did not have the

⁵⁹ Alexander von Humboldt, *Personal Narrative of Travels to the Equinoctial Regions of America during the years 1799-1804*, Translated and Edited by Thomasina Ross, London, 1852, Vol I, p.194. This unflattering image of the timid, unadventurous native surfaced in other contemporary works. The French naturalist d'Orbigny described, for example, how he was often forced 'to immerse myself in the forests absolutely on my own', whilst exploring the Argentine province of Corrientes, 'in order to avoid being distracted at every instant by the puerile fears of my domestic, who, lazy by nature, used to paint with such eloquence the perils attached to these types of journeys that it was sometimes impossible for me not to pay attention to them'. Writing later in the nineteenth century, the Argentine Francisco Moreno sketched an equally derisory portrait of one of his travelling companions in southern Patagonia, an African named Pedro Gómez. Moreno anticipated little from Gómez, since he was, like d'Orbigny's domestic, 'lazy by nature', and he repeatedly lampooned the African's exaggerated fears, relating, for instance, how Gómez cowered in fear at the sight of a dead puma, 'taking such a fright that, without realising that it was harmless, he fled and took refuge in the boat', emerging only once the beast had been skinned and dissected. Such cowardice contrasted sharply with the courageous feats of the hero-naturalist – as was no doubt the literary intention - and it further underlined the bravery of the intrepid explorer. See Alcide d'Orbigny, *À la découverte des Nouvelles Républiques Sud-Américaines*, Biarritz, Atlantica, 2000, p.57 and Francisco Pascasio Moreno, *Viaje a la Patagonia Austral, 1876-1877*, Buenos Aires, Solar/Hachette, 1969, p.265

capacity to appreciate such magnificent scenery, that the aesthetics of landscape are simply beyond them'.⁶⁰ Several naturalists commented explicitly on this supposed character defect, and they consciously differentiated the studious, penetrating gaze of the man of science from the passive, unobservant stare of the native.

An allusion to indigenous ambivalence of this sort surfaces in an article by Francisco Moreno entitled 'El Estudio del Hombre Sud-Americano', published in *La Nación* in 1878. Discussing the merits of anthropology, the Argentine charted the discipline's recent progress in all corners of the world. He claimed that the great scientific expeditions of the eighteenth century had 'revealed to the world the mysterious ruins of Mexico and Peru, those of Egypt, Assyria, Persia and India, buried some of them beneath sands which hid them from *the indifferent gaze of the vulgar*, but which *the clear eye of science* observed' (my italics).⁶¹ Here Moreno differentiated again between the impassive, unquestioning gaze of the uninitiated populace and the curious, inquiring scrutiny of the scientific observer. He contrasted the 'indifferent gaze of the vulgar' with the 'clear eye' of the scholar, who, thirsty for knowledge, subjected the productions of the past to intensive examination.

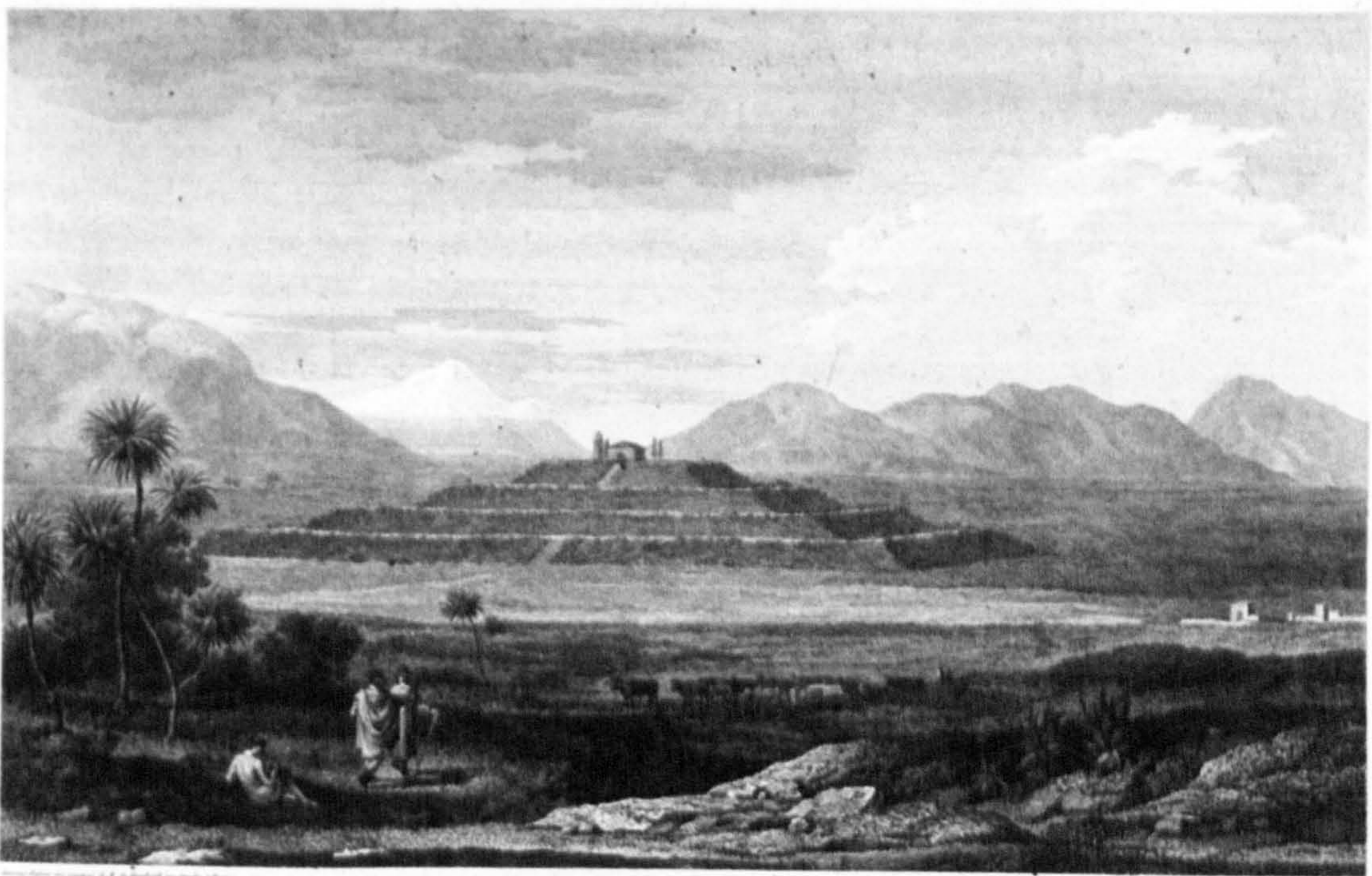
The portrayal of non-European observers as passive and indifferent extended to visual depictions. In *Vision, Race and Modernity*, Deborah Poole argues that contemporary illustrations often juxtapose the conduct of the western explorer with that of a native guide or local inhabitant. In these images, the savant is frequently to be seen admiring the imposing panorama that surrounds him. He executes measurements, scrutinises an unusual plant or architectural feature and sometimes appears visibly moved by what he sees. By contrast, the indigenous observer fails to

⁶⁰ David Arnold, *The Tropics and the Travelling Gaze: India, Landscape and Science, 1800-1856*, Seattle, University of Washington Press, 2006, p.102

⁶¹ Francisco Pascasio Moreno, 'El Estudio del Hombre Sud-Americano', p.7

engage with the scene that so fascinates his better-informed companion. He stands (or, not infrequently, sits) in the background and he stares impassively into the distance.⁶²

Humboldt's plate of the pyramid at Cholula nicely illustrates these contrasting postures (Fig.6). The plate features three people – two men in European dress and an Indian woman. The two men – presumably Humboldt and Bonpland – converse animatedly and gesticulate towards the Pre-Columbian monument. The woman – presumably a local inhabitant – reclines lazily on the grass. She directs her eyes uninterestedly towards the ground, seemingly insensible to the sublime scene before her, and she conspicuously fails to engage with the captivating creation of her ancestors.



Pyramide de Cholula

Fig. 6: *La Pyramide de Cholula*, from Alexander von Humboldt, *Vues des Cordillères et Monumens des Peuples de l'Amérique*, Paris, 1816, Plate III

⁶² Poole, *Vision, Race and Modernity*, p.75

D'Orbigny's botanical illustrations evidence a similar indigenous passivity. One print depicts an Amerindian man leaning against a tree. Another print shows an Indian firing an arrow beneath a palm, whilst a third features a gaucho, as he waits, lasso in hand, for his horse to quench its thirst from a nearby pool (Fig. 7). Though several of d'Orbigny's native characters do engage physically with the interesting foliage that surrounds them, none actively scrutinises or examines the plants in his vicinity, and the majority ignore the botanical riches that the French naturalist dissects and draws with so much care. D'Orbigny accessorises his indigenous subjects with spears, bows and ropes, rather than delicate precision instruments. He also remarked elsewhere on the phenomenon of native apathy, observing how the perils of exploration were so often left to the enterprising foreigner. 'Why is it that, all too often, those very people who stand to gain the most [from the study of local natural productions] regard them with indifference, and are far from taking an interest in the traveller and his devotion to the interests of science, in his journeys that are always hazardous and which, frequently, prove fatal to him?' ruminated d'Orbigny.⁶³

⁶³ D'Orbigny, *Nouvelles Républiques* p.50



Fig.7: Alcide d'Orbigny, botanical illustration, in *À la Découverte des Nouvelles Républiques Sud-Américaines*, ed. Philippe de Laborde Pédelahore, Biarritz, Atlantica, 2000

Sometimes, of course, indigenous people stirred themselves from their indifference and inertia for long enough to impart indispensable information to European naturalists, particularly concerning the medicinal qualities of plants. Even when this happened, however, the latter rarely recognised them as fellow scholars. They perceived Indian or African expertise to be predominantly empirical in nature, lacking in analysis or structure, and they often attributed native discoveries to trial and error, necessity, or fortunate coincidence, rather than prolonged studious meditation.

The British historian William Robertson espoused precisely this view in his 1777 *History of America*. Evaluating the mental capabilities of Amerindians, Robertson conjectured that the curiosity of the American 'savage' did not extend beyond his immediate needs. He maligned the Indian's ability to classify and structure

the nuggets of information he acquired, and he downplayed his powers of reasoning and reflection. 'Only the objects as may be subservient to his use, or can gratify any of his appetites, attract his notice', alleged Robertson, and 'he views the rest without curiosity or attention. Satisfied with considering them under that simple mode in which they appear to him, as separate and detached, he neither combines them as to form general classes, nor contemplates their qualities apart from the subject in which they adhere'. Consequently, 'he is unacquainted with all the ideas which have been denominated *universal, or abstract, or of reflection*'.⁶⁴

Caldas' encounter with the Noanama Indian also captures some of the key dynamics in this type of knowledge exchange. Firstly, we may note the unorthodox – and arguably unethical – strategy that Caldas employs to extract information from his guide – he plies him with drink, a not uncommon seduction technique. Secondly, we see how the creole trusts the accuracy of the Indian's observations, accepting his claims without apparent hesitation. Thirdly, however, we observe how Caldas attributes the Noanama's expertise to a mixture of protracted experience induced by 'necessity' and chance, or 'happy coincidence'. These expressions somewhat

⁶⁴ Scott Parrish, *American Curiosity*, p.239. The French naturalist Charles Marie de la Condamine reached a similar conclusion when he assessed the merits of Quechua, the language of the Incas. Observing that Quechua had no equivalent terms for words such as 'time, duration, space, to be, substance, material [and] body', La Condamine surmised that the Peruvians had no understanding of these abstract concepts. 'The language of Peru lacks terms to express universal ideas', meditated the Frenchman, 'clear proof of the lack of progress that the spirits of these people have made'. This critical study of Quechua exemplified the new approach to indigenous sources, described by Jorge Cañizares-Esguerra in *How to Write a History of the New World*, whereby Enlightenment scholars started to analyse them not so much to extract factual data about their world, but rather to assess the intellectual capacity of the people who had produced them. See Charles Marie de la Condamine, *Rélation Abrégée d'un Voyage dans l'intérieur de l'Amérique Méridionale, depuis la côte de la Mer du Sud jusqu'aux côtes du Brésil et de la Guiane, en descendant la rivière des Amazones*, Paris, 1745, p.419 and Jorge Cañizares-Esguerra, *How to Write a History of the New World: Histories, Epistemologies and Identities in the Eighteenth-Century Atlantic World*, Stanford, Stanford University Press, 2001, Chapter 1 – 'Natural Histories of the Mind', pp.111-129

trivialise the native's contribution to knowledge, and certainly strip it of any theoretical acumen.⁶⁵

Caldas' account also corroborates Mauricio Nieto's contention that 'the knowledge of natives was not recognised as valid until it had been translated'. Nieto suggests that Indian expertise needed to undergo various conversions before it could qualify as scientific data, and Caldas' narrative substantiates this view, for he effectively appropriates the Indian's 'contra' for western science, examining it with a botanist's eyes and classifying it within the framework established by Linnaeus. Indeed, the steps the creole took to appropriate the Noanama's expertise correspond closely to the measures outlined by Nieto. These included 'referring to the plant by its Latin name' ('besleria'); 'classifying it according to the Linnaean system' ('I fixed the species'); 'providing a graphical representation of the plant' ('I drew it'); and 'describing it in accordance with knowledge of contemporary botany' ('doing experiments on it').

To conclude, then, indigenous people were generally denied the prestigious designation of 'naturalist'. Though they provided essential information about the natural productions of their homelands their apparent apathy, their irrational fears, their unwillingness to sacrifice their bodies to science and their supposedly limited capacity for abstract thought disqualified them from this professional title. Their names were rarely commemorated, whether in scientific treatises, travel narratives or botanical nomenclature, and most naturalists obliterated or at best anonymised their contribution, using impersonal – and often possessive – terms such as 'my Indians' or 'my slaves'.⁶⁶

⁶⁵ Nieto Olarte, *Remedios para el Imperio*, p.173

⁶⁶ Londa Schiebinger has noted how few non-European people had plants named in their honour, in spite of the important contributions they made to scientific knowledge. 'I have found only the one male

Perhaps aware that the boundary between ‘popular’ and ‘scientific’ knowledge nevertheless remained porous, European naturalists made a concerted effort to distinguish their own work from that of slave healers or Indian herbalists. They emphasised their extensive training, their theoretical acumen and their scholarly rigour, and they juxtaposed this favourably with the haphazard, ‘unscientific’ knowledge dispensed by their popular rivals. Responding to Antonio Alzate’s suggestion that Nahuatl plant names be used to construct a ‘new botanical language’ in Mexico, for instance, the Spanish botanist Vicente Cervantes snorted, tellingly, that such terminology ‘is very good for speaking in plazas and crowds with Indian herbalists and vegetable sellers [both identified as female in the Spanish], but not in Academies of the Learned’.⁶⁷ The definition of ‘herbolario’ in the *Diccionario de la Lengua Española*, meanwhile, mutated from the relatively neutral ‘he who has knowledge of the herbs, their virtues and properties’⁶⁸ in 1791 to the more judgemental ‘he who sells medicinal plants *without science*’ in 1826 (my italics).⁶⁹ This later definition stresses the ‘unscientific’ nature of the herbalist’s work. It contrasts with the definitions for ‘naturalista’ – ‘he who examines and describes the

freed slave, [a Surinamese slave named] Quassi, immortalised in eighteenth-century botanical nomenclature’, states Schiebinger. ‘As far as I am aware, no Amerindians were so honoured, although a number of scientific plant names do derive from Native American languages’. See Schiebinger, *Plants and Empire*, p.217. For a longer discussion of the issues surrounding botanical taxonomy, see chapter 4.

⁶⁷ ‘Al Sr. Director del Real Jardín Botánico. Respuesta del Discípulo a la Carta Satisfactoria, en la que se impugnan las objeciones que propone su Autor contra el Systema de Linneo’, *Gazetas de México*, Suplemento a la Gazeta de México del Martes 15 de Julio de 1788, p.122

⁶⁸ *Diccionario de la Lengua Castellana, compuesto por la Real Academia Española, reducida a un tomo para su más fácil uso. Tercera edición, en la qual se han colocado en los lugares correspondientes todas las voces de los suplementos, que se pusieron al fin de las ediciones de los años de 1780 y 1783, y se han intercalado en las letras DE y F nuevas articulos, de los quales se dará un suplemento separado*, Madrid, Viuda de Ibarra, 1791, p.475

⁶⁹ *Diccionario de la Lengua Castellana, por la Academia Española, compendiado por Don Cristoval Pla y Torres, Profesor de Lengua Castellana*, Paris, Imprenta de Rignoux, 1826, p.302

properties and analogies between animals, plants and fossils'⁷⁰ – and 'botanista' – 'he who professes botany', a 'science that prescribes rules by which to know the plants'.⁷¹

Creole Crusaders

If indigenous people ultimately failed to qualify as bonafide naturalists, then the position of creoles was more ambiguous. On the one hand, the creoles' European roots and their (albeit imperfect) access to European literature made them aware of the accoutrements and conduct that defined the naturalist, and offered them a model to which they could aspire. On the other hand, the creoles' Spanish heritage and their long residence in what some believed to be an inhospitable climate compromised their scientific credentials in the eyes of certain European writers, who considered them temperamentally, constitutionally and intellectually ill-suited for the demands of natural history. As a consequence, Spanish American savants found themselves obliged to defend their curiosity, their erudition and their stamina before a sceptical European audience. They had to prove that they possessed the physical, moral and mental qualities demanded of the naturalist at a time when many suspected they did not.

Creoles stood accused of a variety of deficiencies, ranging from chronic indifference to bodily weakness. European travellers chastised them for their failure to study the natural productions in their locale. They questioned whether pampered creole elites had either the commitment or the inclination to devote themselves to the natural sciences, and they ridiculed their ignorance in scientific matters. Some commentators ascribed these failings to their long residence in an insalubrious

⁷⁰ Ibid., p.394

⁷¹ Ibid., p. 84

climate, which sapped their energy and vitality. Others attributed them to ingrained cultural prejudices, which portrayed hard physical work as socially degrading and discouraged the creole elites from strenuous physical exertion.

One proponent of the climate theory was the Prussian philosophe Cornelius de Pauw, who believed that men and beasts degenerated in the New World (see chapter 5). Reviewing the creoles' paltry accomplishments in the field of natural history, de Pauw alleged that the latter had contributed nothing to the understanding of American nature, in spite of having ample opportunities to do so. The Prussian scoffed that '[the creoles] have never given us a single work on the animals, the insects, the plants, the minerals, the climate, the singularities and the phenomena of America', and he concluded that 'it is to European botanists and physicians that we owe all the knowledge of natural history that has been acquired in the Indies'.

What would we know without Oviedo, Pison, Margrave, Benzo, Clusius, Merian, Leri, Clayton, Cornut, Barrère, Catesby, Hans Sloane, Feuillée, Plumier, La Condamine, Bouguer, Jussieu, Calm, Browne and so many others who, in order to instruct us, have travelled in a country that the creoles could have described without leaving their homes, if they had the least capacity, the least inclination, [or] the least intelligence?

taunted de Pauw. The answer was clearly 'very little', for the creoles were evidently too lazy and too stupid to analyse the natural productions of their own continent.⁷²

The Spanish botanist Hipólito Ruiz diagnosed a similar connection between the American environment and the moral/physical shortcomings of the creole population. Describing the 'character and constitution of the inhabitants' of Lima, Ruiz sketched a dispiriting picture of dissolute, ill-disciplined individuals, unable to

⁷² Cornelius de Pauw, *Récherches Philosophiques sur les Américains, ou Mémoires Intéressants pour Servir à l'Histoire de l'Espèce Humaine*, London, 1770, Vol. II, p.142

control their passions. He ascribed these defects to the presence of ‘acrid humours, great heat in the blood and in the imagination, which are, with time, the inducement of very vehement passions’, and he characterised the average creole as ‘lewd...cowardly, dishonest [and] unfaithful’.⁷³ Such persons were clearly not ideal candidates for the mentally and physically demanding work of the naturalist, and Ruíz intimated as much elsewhere in his text, when he described the reaction he and his fellow expeditionaries received whilst botanising in the environs of Lima. The Spaniard recounted how the locals shadowed the botanists with distrustful fascination during their excursions, ‘pointing at us and calling us sorcerer herbalists [brujos yerbateros]’, and he was particularly impressed by the creoles’ utter astonishment that the botanists should voluntarily travel about on foot in the Peruvian countryside, ‘something that they never do’.⁷⁴ This reluctance to expend energy unless absolutely necessary chimed with Ruíz’s earlier description of the limeños as passionate but weak-willed individuals whose moral and physical strength had been eroded by a corrupting climate. It was clearly at odds with the study of natural history, where rigorous activity was unavoidable, and where practitioners actively cherished their ability to withstand hardship as a badge of professional pride.

A more nuanced, but similarly sober assessment of creole abilities emanated from the pen of de Pauw’s countryman, Alexander von Humboldt. Writing to Mutis about the inhabitants of Popayán, Humboldt expressed considerable doubt as to the New Granadans’ scientific aptitude. The Prussian questioned whether cosseted creoles would be able to tolerate the hardships synonymous with the study of nature, and he intimated that the elite’s engagement with the natural sciences was half-hearted and

⁷³ Ruíz, *Relación*, p.18

⁷⁴ *Ibid.*, p.3

superficial. 'Here everyone prescribes [remedies] because they have read Tissot [and] everyone knows chemistry and physics because they have seen [the Abbé Pluche's] *Espectáculo de la Naturaleza*', meditated Humboldt, yet when hard physical work threatened, creole enthusiasm evaporated. 'No-one wanted to accompany us in our difficult excursions, nor has anyone asked us the name of a plant or of a stone', charged Humboldt. Moreover, 'nobody has examined the marvels that they have around them, such as the mouths of the volcano [of Puracé], its height, or its situation, albeit that this reproach could be made throughout America'. Humboldt subsequently tempered his criticism somewhat, discerning with approval 'an intellectual effervescence that was unknown in 1760, a desire to possess books, and to know the names of famous men', but he remained sceptical as to the creoles' capacity for real progress in a social environment that inhibited their physical development. 'What can we expect from youths surrounded and served by slaves, who fear the rays of the sun, who defer everything till tomorrow and who are terrified by the mildest discomfort?' sneered Humboldt. Probably very little, for such conditions could not help but spawn 'an effeminate race, incapable of the sacrifices that the sciences and society demand'.⁷⁵

⁷⁵ Mauricio Nieto Olarte, *Orden Natural y Orden Social*, p.295. A passage in Humboldt's *Personal Narrative* reiterated this point. Resident in the city of Caracas, the Prussian explorer decided to ascend the nearby mountain, the Silla, and to subject it to scientific study. Humboldt expected that he would find in Caracas 'many persons well acquainted with the lofty surrounding mountains', who would be able to offer him guidance and information. To his surprise and disappointment, however, this proved not to be the case. 'We could not', lamented Humboldt, 'discover at Caracas a single person who had visited the summit of the Silla'. 'No journeys are undertaken in these countries to gather alpine plants, to carry a barometer to an elevated spot or to examine the nature of rocks', continued the explorer, and the creoles recoiled from anything that threatened 'fatigue' or bodily exertion. When a group of *Caraqueños* did ultimately stir from their domestic routine to accompany Humboldt and Bonpland up the Silla their conduct during the excursion did nothing to dispel Humboldt's original impression. According to the Prussian, the creoles, unaccustomed to scaling mountains, made heavy work of the ascent, delaying the Europeans' progress. They were, at length, spotted 'descend[ing] the mountain instead of climbing up', hardly a sign of stamina and perseverance. See Humboldt, Alexander, *Personal Narrative of Travels to the Equinoctial Regions of America during the years 1799-1804*, Translated by Helen Maria Williams, London, 1822, 2nd edition., Vol. III, pp.479-484

American savants were naturally anxious to dispel these unflattering images, and to prove that they could be active agents in the study of their continent's natural history, not merely passive spectators. Their response to European critics was, however, multifaceted and occasionally contradictory, consisting of a mixture of adamant denials, partial acceptances and vows to do better in future. Some creoles countered the calumnies of de Pauw and his cohorts by summoning a legion of countrymen who had excelled themselves in scientific pursuits. Other creoles conceded that ignorance and apathy were ripe in Spanish American society, but exempted themselves from this general reproach, exhorting their less committed compatriots to follow their noble example.

Emblematic of the first position was the Peruvian physician Hipólito Unanue, who trumpeted the achievements of various American naturalists in the *Mercurio Peruano*. In 1792, Unanue penned an obituary for the recently deceased naturalist Antonio Pineda, in which he interpreted the savant's untimely demise as a tragedy not simply for Spain, but also for America. Unanue's justification for this was that Pineda had been born in Guatemala City, and was thus technically a creole, even though he migrated to Spain at the age of only six. 'His death', mourned Unanue, 'has deprived the Spanish Army of a hero in whom to trust the ancient glory of its arms; the Republic of Letters of a savant who was destined one day to become one of its finest ornaments; the Monarchy of a laborious naturalist whom it will be difficult to replace, even with many active professors; *and our America of an illustrious son*'.⁷⁶ Pineda had thus served his patria (Peru), his nation (Spain) and the wider scientific community through his heroic scientific endeavours.

⁷⁶ Unanue, *Elogio*, p.11 (my italics)

Elsewhere, in an article on botany, Unanue saluted a second creole naturalist, the 'Peruvian' Pedro Franco Dávila. A native of modern day Ecuador and a long-term resident of Paris, Dávila was the proud owner of an impressive natural history collection, which eventually formed the basis of the Real Gabinete in Madrid. A patriotic Unanue appropriated the ex-patriot collector as a fine specimen of American genius. He accorded particular significance to the reverential comments of European critics, who judged Dávila's work to be of the highest standard, and he held the quiteño up as a model for his compatriots to emulate. 'The Peruvian Franco Dávila made himself famous in Paris for his cabinet of Natural History', rhapsodised Unanue, 'and in the entire world for the catalogue he published, divided into three volumes, of the precious things that it contained'. The author of the *Mercurio Peruano* transcribed Padre Roselli's eulogy to Dávila, which he considered 'capable of immortalising Peru', as well as Michel Adanson's observation that Dávila's collection was 'the richest that any private person has yet formed, especially regarding the part related to Natural History', and he surmised that other Americans would soon follow the quiteño's illustrious footsteps. 'Will the botanical garden of Lima remain in the planning stages [when] Rome, Paris and Madrid have recognised the talent of the Peruvians for natural history?' questioned Unanue.⁷⁷

A less triumphal, but perhaps more realistic assessment of the state of creole science appeared in Caldas' translation of Humboldt's *Cuadro Físico de las Regiones Ecuatoriales*. In a footnote, Caldas noted the Prussian's allegations concerning the inhabitants of Popayán, and protested that they were factually incorrect, since individuals from that town *had* in fact ascended the nearby volcano and executed a series of scientific experiments. '[Humboldt] did not know [when he made this

⁷⁷ Unanue, 'Descripción Científica de las Plantas del Perú', p.113

accusation] that don Antonio Arboleda, don Juan Josef Hurtado and I had scaled this mountain the previous year', stated Caldas; 'that we took up instruments, analysed its mineral waters and collected and described the most beautiful part of its vegetation'. To say that no creole had examined the local topography was therefore unfair.

Having thus disproved the technical accuracy of Humboldt's reproach, however, the New Granadan proceeded to accept its essence, conceding that the traveller's charges of 'laziness and weakness' were not entirely unfounded. 'Three individuals do not make a law', sighed Caldas, 'and we believe the censure of Humboldt to be all too just'. How many creoles *had*, after all, taken the trouble to explore, examine and map their native region? How many had calculated the height of the nearby mountains? And what 'censures would have emanated from [the Prussian's] philosophic pen' if he had known that the newly founded astronomical observatory 'is seen with boredom, that the designs of its founder are questioned and that its demolition is desired?' Reviewing the situation with a critical eye, Caldas confessed that Humboldt's allegations contained more than a grain of truth, and he admonished his compatriots to rectify this shameful situation. 'We must reprehend ourselves before we are reprehended by another enlightened European who visits us', the creole insisted forcefully.⁷⁸

If the uneducated majority thus fell short of the naturalist's laudable qualities, then it was a different story for the scholarly elite. Some aspiring creoles consciously modelled themselves upon their European counterparts, whose sufferings they identified as a source of inspiration. Many recycled the images and rhetoric that appeared in European travel accounts, whilst some fused the scientific stereotypes that emanated from the Old World with their own personal religious and social heritage.

⁷⁸ Caldas, 'Cuadro Físico de las Regiones Ecuatoriales', *Obras*, p.42

One creole to adopt the persona of the suffering savant was the Uruguayan Larrañaga. Writing to the American in 1822, the French botanist Auguste de Saint Hilaire requested that Larrañaga accommodate the letter's bearer, the Prussian Fray Sellow, and accompany him during his studies. Larrañaga acquiesced to the request, not merely because Saint Hilaire was his friend, but, more specifically, because Sellow was a naturalist, a profession that the creole associated with several positive character traits. 'Mr Sellow is a naturalist', stated Larrañaga, 'and that information suffices as a recommendation. Accustomed to suffer so many privations, and to appreciate the most minimal things in the creation, what more could he need to be charming?'⁷⁹ Larrañaga evidently surmised from Sellow's vocation alone that the two men would be on amicable terms. The creole instinctively associated the study of nature with personal hardship and religious orthodoxy, and the mere mention of the word 'naturalist' seems to have conjured a host of positive character traits which Sellow, as a man of science, could not fail to possess.

Larrañaga did not disclose the source of this stereotype, though he had presumably absorbed it from the limited scientific works at his disposal, as well as his correspondence with savants such as Bonpland and Saint-Hilaire himself. More explicit was the Argentine palaeontologist/anthropologist Francisco Pascasio Moreno, who ascribed his interest in the natural sciences directly to the reading matter consumed during his youth, and who modelled himself deliberately on European martyrs to science. Opening his work *Viaje a Patagonia Austral* (1876), Moreno recounted how, as a boy 'the reading of the adventure of Marco Polo, of Simbad the Sailor and the relations of the missionaries in China and Japan published in the *Anales de Propaganda Fide*, and read out loud in the refectory of the school, awoke in me a

⁷⁹ Letter from Dámaso Antonio Larrañaga to Auguste Saint-Hilaire, 8 February 1822 in Gallinal, *Escritos*, Vol. III, p.285

strong desire to traverse lands'. The Argentine went on to explain that these texts not only exhilarated him and whetted his appetite for adventure, but that they shaped his conception of what a man of science should do, what his priorities should be, and how he should behave. 'More than anything, the short extracts that the newspapers of the time were publishing of the voyages and explorations of [David] Livingstone, that true apostle who knew so well how to reconcile the ideas of Christ with those of science, and the news of the expeditions sent in search of [John] Franklin, lost amidst the ices of the north, exercised upon my susceptible brain a singular and explicable effect', reminisced Moreno. 'They aroused in my soul a feeling of profound admiration for those martyrs to science, and a burning desire to follow, in a more modest sphere, the example of such daring enterprises'. Moreno thus fashioned himself as an Argentine disciple of Livingstone, ready to consecrate his life to science.⁸⁰

An even more impassioned believer in the chaste, morally upright savant was the astronomer-botanist Caldas. The New Granadan expatiated repeatedly on the physical and mental trials that afflicted the naturalist. He admired the dedication and virtue of European savants – recall his earlier praise of Humboldt as the 'voluntary martyr to galvanism' – and he sculpted a similar professional profile for himself, employing equally emotional rhetoric.

Writing to his friend Antonio Arboleda, for example, Caldas recounted the long, draining hours that he had spent star gazing in Bogotá's newly founded astronomical observatory. The creole announced melodramatically that 'I find myself

⁸⁰ Francisco Pascasio Moreno, *Viaje a Patagonia Austral*, p.27. John Franklin was an arctic explorer. He disappeared in 1845 whilst searching for the mythical North West Passage linking the Atlantic and the Pacific oceans. Several expeditions were sent to search for him, but it was many years before the remnants of his expedition were discovered. See Fergus Fleming, *Barrow's Boys*, London, Granta, 1998.

in mediocre health, buried in the observatory and devoted to the contemplation of the skies'. He went on to declare that he was 'happy in this solitude', for which his strict Catholic upbringing had prepared him, and he concluded with a foray into natural theology. 'Fortunate is the savant...who reads in all the creatures the name of his Maker', rhapsodised Caldas, 'and a thousand times more fortunate if he worships him, if he loves him and recognises his gifts with an irreprehensible conduct'.⁸¹

Elsewhere, in a letter to his patron Mutis, Caldas embraced the image of the suffering savant with even more vigour. Petitioning his mentor for money, so that he might accompany Humboldt on his travels, the New Granadan asserted vehemently that 'Caldas has no other ambition than to instruct himself and be useful'. He insisted that he did not 'want an income, but only honour, and the sweet pleasure of serving his fellow beings', and he savoured the hardships inherent in the vocation of the naturalist. '[Caldas] knows the poverty of his learning, [and] he knows that it is confined to a smattering of mathematics, of botany and of physics', conceded the creole, referring to himself in the third person, 'but he knows also that he has an ardent love for knowledge, a devouring desire to instruct himself that will go to the pole; that will face all the horrors of the glacial and the torrid zones; that will traverse with courage the horrifying deserts of Arabia in order to follow the voluntary martyr to galvanism!' Such statements echo the protestations of contemporary European savants, who employed similarly sentimental language and attached equal value to such qualities as 'courage' – both physical and intellectual – 'love for knowledge' and 'solitude'.⁸²

⁸¹ Letter from Caldas to Antonio Arboleda, 28 February 1806, Chenu, *Caldas*, pp.213-214

⁸² Letter from Caldas to José Celestino Mutis, 6 February 1802, Chenu, *Caldas*, p.159

When Humboldt crushed Caldas' ambitions by declining to include the creole in the party for his ascent of Mount Chimborazo, the American was moved to offer an even more revealing definition of the physical and moral qualities that a naturalist ought to possess. In a letter to Mutis, Caldas attempted to explain why the Prussian had jilted him in favour of the young quiteño Carlos Montúfar. He smarted at the injustice of this decision, emphasised his own eminent suitability for the trip and, in a highly revealing passage, went so far as to question Humboldt's own professional conduct.

Caldas addressed first the physical traits demanded of the naturalist.

Humboldt, it would seem, had dispensed with the New Granadan's services because he considered him physically ill equipped to accompany him on such an arduous expedition. Caldas, however, vigorously denied this, and, in his letter to Mutis, he summoned the testimony of trustworthy individuals who could vouch for his energy and stamina. 'You have in Santafé Torres, Pombo and Arroyo', protested Caldas. 'They know me, they are honourable men; they will tell you if my constitution is weak'.⁸³ Later, in a memoir on a projected field trip, the creole reprised the matter of his physical capabilities. He listed the main qualities required for the study of nature and he emphasised his own eminent suitability for this profession. Concluding his memoir, Caldas claimed to possess 'a perfect health [and] a head that works for hours, or, I may say, that never stops working'. He purported to be an individual 'who fasts without fatigue, and without detriment to his tasks; who spends entire weeks at the foot of his quarter circle; who is able to go without sleep for many consecutive nights...who ascends and descends mountains on foot, who does not know the meaning of a serious illness' – attributes ideal for the study of nature – and he

⁸³ Letter from Francisco José de Caldas to José Celestino Mutis, 21 April 1802, cited in Chenu, *Caldas*, p.179

proceeded to cast aspersions on the physical robustness of his rivals. 'The Baron [Humboldt] fainted on [Mount] Pichincha', divulged Caldas; 'is that proof of strength?' And was it not the young Montúfar who, aside from being mentally ill prepared for the ascent of Chimborazo, would falter with the slightest exertion? 'It is the weak youth who cannot suffer a journey that is undertaken by the most spoiled and delicate lady', the New Granadan sneered derisively, underlining scientific study as a masculine, physically demanding activity.⁸⁴

More revealing than the physical traits that Caldas ascribed to the naturalist was the moral code to which he was expected to adhere. Like Moreau-Saint-Méry, Caldas subscribed to the notion of the celibate, self-sacrificing man of science. Writing to Mutis, however, he intimated that this code of conduct had been violated – not by himself, but by Humboldt – and that this violation was the true reason for the Prussian's recent coldness towards him.

Explaining the situation to his mentor, Caldas alleged that Humboldt's behaviour, exemplary in Santafé and Popyayán, had deteriorated in the corrupting atmosphere of Quito, where 'one breathes only pleasures'. 'In the first two cities, [his conduct] was worthy of a savant', sighed the creole, 'but in the last it is unworthy of an ordinary man'. Though somewhat cagey as to the precise nature of Humboldt's transgressions, Caldas insinuated that they were of a sexual nature, reporting that the Baron, had 'contracted a friendship with some obscene and dissolute youths'.⁸⁵ The

⁸⁴ Francisco José de Caldas, 'Memoria sobre el origen del sistema de medir las montañas y sobre el proyecto de una expedición científica', in *Obras*, p.302

⁸⁵ Letter from Caldas to Mutis, 21 April 1802, in Chenu, p.179. Caldas was more explicit about the nature of Humboldt's transgressions in subsequent letters. Writing to Juan José Hurtado and Antonio Arboleda a few weeks later, the naturalist alleged that Humboldt had abandoned him in favour of 'a showy [currutaco], ignorant and dissipated youth' – Montúfar. Corresponding with Mutis the following month, meanwhile, Caldas insinuated that Humboldt's relationship with Montúfar was of a homosexual nature. He accused the Prussian once more of allowing passion to cloud his judgement, and he smarted bitterly that 'Barón Humboldt left here on the 8th of the current [month] with Mr Bonpland and his Adonis, who does not hinder his in his journey as does Caldas'. See Letter from Caldas to Juan José

New Granadan juxtaposed Humboldt's wayward behaviour with his own irreproachable deportment, speculating that his unconcealed disgust at the Prussian's actions was the real cause of their estrangement. 'He does not want a silent companion who reproves him without speaking', agonised Caldas. But 'how could I approve without making myself complicit [in his sins]?'⁸⁶

What is truly remarkable about Caldas' allegations is not that the creole disapproved of Humboldt's behaviour *as a man*, but that he disapproved of his behaviour *as a man of science*. The Baron's conduct evidently scandalised his American counterpart at many levels. Caldas' comments make it clear, however, that his primary grievance was the manner in which Humboldt's extra-curricular activities had distracted him from his vocation and, worse, tarnished that vocation in the process. This sentiment arises clearly when Caldas scolds Humboldt for allowing 'the object of his affections' to accompany him in his field work, 'mixing his weaknesses with the sublime functions of the sciences'. It resonates even more clearly a couple of sentences later, when the disconsolate creole describes his exasperation with the Baron and imagines the ghost of Sir Isaac Newton rising from his grave to correct his wayward disciple. 'Sometimes I feel sorry for this youth, and sometimes I grow angry', confessed Caldas. 'When this last passion animates me, it seems as though I see the ashes of Newton come back to life, of Newton who never approached a woman, and, with an angry and terrible expression, say to the young Prussian: "Is it thus that you imitate the example of purity that I left to my successors?"'⁸⁷ Such fantasies indicate unequivocally Caldas' belief that the naturalist could not mix work

Hurtado and Antonio Arboleda, 6 May 1802 in *Cartas de Caldas*, p.179; and Letter from Caldas to Mutis, 21 June 1802, in *Cartas*, p.182.

⁸⁶ *Ibid.*, p.180

⁸⁷ *Ibid.*, p.179

with pleasure. The pursuit of science required personal and emotional sacrifices, not merely physical ones.

Conclusion

Naturalists attempted to sculpt a distinctive professional identity at a time when the actual parameters of their work were somewhat nebulous. They dissociated their contribution to science from that of indigenous people, whose input was predominantly empirical. They also distanced themselves from women and dilettantes, who engaged in natural history on a purely recreational basis and who eschewed the physical and personal deprivations embraced by the genuine devotee.

In order to separate their work from that of these rival groups, naturalists adopted a variety of tactics. They trivialised the contribution of popular herbalists and other native peoples as un-theoretical, and, in effect, 'unscientific'. They brandished a dazzling array of precision instruments to attest their own precision and scientific rigour, and they constantly reiterated their love of truth and their commitment to accuracy.

Intrepid men of science also conjured up the alluring image of the embattled hero-naturalist, who forfeited his comfort, his health and sometimes his life in pursuit of natural knowledge. This image rested partly on the physical deprivations endured by the fearless savant, as he scrambled up mountains, penetrated forbidding jungles or braved the assaults of ferocious animals. It rested partly on the intellectual agonies of the naturalist, as he wrestled with complex methodological problems. And it rested partly on the personal sacrifices he was expected to make in pursuit of scientific truth – sacrifices that included a vow of austerity and even, in some cases, a vow of celibacy. The French explorer d'Orbigny evoked precisely these deprivations when he

described how the beleaguered man of science ‘feels himself in effect, for entire nights devoured by mosquitoes, who runs the risk at every instant of losing himself in ravines [and] sees himself constantly exposed to falling under the claws of jaguars’.⁸⁸ D’Orbigny’s compatriot Pierre Boitard explained, likewise, how, in order to collect coveted specimens, the naturalist must ‘arm himself with patience, with valour and above all with love for science, and go to face in far off climates the harsh weather of a foreign sky, the savage customs of often inhospitable peoples and the fatigues of a long voyage’.⁸⁹

Savants in the Hispanic world eagerly subscribed to these Europe-wide stereotypes. They too embraced the physical and mental trials inherent in the work of the naturalist, and they presented themselves – and were presented by others – as modern day missionaries or civilian conquistadors. The botanist Cavanilles, for example, saluted those men who ‘make sacrifices of their comfort, of their interests and of their health’ to enhance human knowledge.⁹⁰ The New Granadan Caldas, meanwhile, traced a direct analogy between the soldier and the naturalist. The American declared that ‘the sciences, like war, require valour [and] intrepidity’ and he asserted that ‘a cowed spirit, a timid person who does not possess these fortunate qualities, is a cowardly soldier; he does not deserve to enter into the temple of glory; this right is reserved for those enterprising souls who depart from the well-trodden path and leave common things to common people’.⁹¹

⁸⁸ Alcide Dessalines D’Orbigny, *Nouvelles Républiques*, p.50

⁸⁹ Pierre Boitard, *Manual del Naturalista Disector*, pp.1-2

⁹⁰ Antonio José Cavanilles, ‘Discurso sobre algunos Botánicos Españoles del siglo XVI’, p.103

⁹¹ Letter from Caldas to Juan José Hurtado y Arboleda and Antonio Arboleda, 6 May 1802, Academia Colombiana de Ciencias Exactas, Físicas y Naturales, Bogotá (ed.), *Cartas de Caldas*, 1879, p.178

Spanish and creole savants perhaps had a particular interest in propagating these flattering images, since they stood in stark contrast to a number of less positive national stereotypes. Spaniards, repeatedly condemned for their obsession with precious metals, were determined to exhibit a seemingly more altruistic passion for botanical and zoological ‘treasures’. Creole scholars, on the other hand, were often perceived as constitutionally and temperamentally ill-suited to the onerous pursuits of natural history, and were consequently anxious to parade their physical fortitude. Both groups employed strikingly similar rhetoric to their French and British counterparts, suggesting a familiarity with the prevailing iconography and a desire to showcase their own credentials for participation in a broader scholarly culture.

Spanish and creole savants often implied that they were part of a progressive avant garde who embraced the deprivations of natural history at a time when many of their less enlightened compatriots continued to regard them with horror and suspicion. Whilst this was doubtless often an accurate perception, there is nevertheless evidence that the image of the self-sacrificing naturalist diffused more widely through the social hierarchy, seeping into popular literature as well as scientific periodicals. There is perhaps no better example of this than a short story by the Argentine novelist Juana Manuela Gorriti, which features an illuminating sketch of a naturalist.

Entitled somewhat ominously *Si Haces Mal, No Esperes Bien* (*He Who Does Evil Can Expect No Good*, 1861), this story is set in Peru and recounts the tale of a young girl, Cecilia, the product of the rape of an Indian woman by a Spanish soldier. Aged only five, Cecilia is snatched from her mother by a party of men commanded by her father, but then abandoned when the soldiers are attacked by bandits. At this point the naturalist intervenes, rescuing the young girl and taking her back to his native France,

where he raises her as his own child, under the name of Amelia. The naturalist then perishes, and we rejoin the story twelve years later, when the grieving Cecilia/Amelia returns to Peru with her lover Guillermo. Here she discovers, by a cruel twist of fate, that the latter is in fact her half-brother, a realisation that occurs when she is unexpectedly reunited with her Indian mother during an excursion in the mountains.

Whilst the naturalist's role in this sordid, tragic tale is evidently brief and functional, it is nevertheless revealing. Firstly, the explorer is notable for being the only truly innocent character in Gorriti's tale of rape, abuse and incest. Secondly, it is significant that the author should have selected a man of his profession to fulfil this narrative function, for her choice suggests that a naturalist was by no means an uncommon figure in the Peruvian Andes by the mid-1840s.

Gorriti's naturalist is also interesting because he conforms perfectly to the stereotype concocted in Europe. He is French, as many post-independence naturalists were. He enters the story armed with the typical accessories of the scientific explorer – a 'large suitcase' which turns out to be his 'naturalist's baggage, and which contains specimens from 'the vegetable and mineral kingdom' - and he adopts the abandoned child in the hope that she 'will console my solitude', the perpetual affliction of the diligent man of science. When the naturalist ultimately expires, Gorriti idealises his saintly existence, describing how this 'wise traveller...consecrated to science his fortune and his life', and she specifies that he bequeathed his grieving daughter 'only his illustrious name and his austere virtue', thereby summoning the by now familiar image of a man of science, who sacrificed everything in pursuit of his vocation. Her

fictional naturalist thus harmonises almost entirely with contemporary European conceptions of the scientific explorer as austere, virtuous, and prematurely deceased.⁹²

⁹² Juana Manuela Gorriti, 'Si haces mal, no esperes bien', in *Suenos y Realidades*, Buenos Aires, 1907, Vol II, pp.146-174

Conclusion

The late eighteenth century witnessed a growing engagement with natural history in Spain and its American colonies. This engagement was supported financially and institutionally by the Spanish Crown, which orchestrated scientific expeditions, patronised aspiring naturalists and founded museums and botanical gardens. It manifested itself in increased public involvement in the natural sciences, as savants like Mieg strove to banish 'sterile admiration' from museum visits. It also reflected changing attitudes towards scientific practitioners, whose intellectual heroism and physical sufferings attracted increasing reward and prestige at a time when virtue and personal merit were slowly superseding an impeccable genealogy as the basis for social recognition.

Although Spanish interest in natural history had a long gestation period, most contemporaries dated its emergence around 1750, and particularly during the reign of Charles III. The botanist Mutis claimed that 'towards the middle of the present century, Spain awoke from its previous lethargy', when 'some savants and nobles developed a taste for the natural sciences'.¹ The Prussian explorer Humboldt, meanwhile, commented that 'since the close of the reign of reign of Charles III and under that of Charles IV, the study of the physical sciences has made great progress, not only in Mexico, but in general in all the Spanish colonies', and he conjectured that 'no city in the new continent, without even excepting those of the United States, can display such great and solid scientific establishments as the capital of Mexico'.²

For the Spanish government, natural history offered a new and enticing source of national glory and material wealth. Reforming ministers envisaged the study of

¹ Mutis, *Flora*, Vol. I, p.57

² Humboldt, *Political Essay on the Kingdom of New Spain*, cited in Lynch, pp.292-293

nature as a means of reviving Spain's flagging economy. Savants eagerly anticipated the discovery of unexploited mineral deposits and medicinal plants, whilst all patriotic Spaniards hoped to dispel their country's unflattering reputation as an ignorant and avaricious nation, unacquainted with scholarly pursuits.

The collection, classification and exhibition of natural objects also had an important figurative value, of which the Crown was keenly aware, for the ability to amass specimens from across the globe symbolised both the extension of Spain's empire and the effectiveness of its bureaucracy. The fauna and flora on display at the Real Jardín Botánico and the Real Gabinete de Historia Natural bore impressive visual testimony to vast overseas dominions and efficient collecting mechanisms. Several commentators equated these botanical and zoological treasures explicitly with Spain's imperial grandeur, and one, the French ambassador, Jean François Bourgoing, interpreted the bountiful produce of the botanical garden as tangible proof of Charles III's global potency. 'This monarch endeavoured to make [the garden] one of the most precious collections of its kind, by laying under contribution all the vegetable kingdom of his dominions', rhapsodised Bourgoing, 'some part of which, it has long been said, is perpetually warmed by the rays of the sun, and which in such different soils and climate must alone produce every kind of tree, shrub and plant which grows on the bosom of the earth'.³

From the metropolitan centre, therefore, the enterprise of natural history collection and classification represented an exercise in economic rejuvenation and imperial posturing. For those subjects who studied the natural world on the colonial periphery, however, the project appeared rather different. Where Spanish savants relished the ability to collate, compare and exhibit natural products from around the

³ Bourgoing, *Travels in Spain*, p.101

globe, in the botanical garden, the royal pharmacy or the museum, their American counterparts cherished their proximity to nature's riches and the opportunity for sustained observation in the field. Where Spaniards subscribed to universal systems like Linnaean botanical classification, creoles rejoiced in the uniqueness and diversity of New World productions. And where Bourgoing presented the Spanish Empire as an emporium containing all known flora, Americans cast their native regions as microcosms, blessed with a staggering variety of climatic conditions and the perfect laboratories in which to conduct scientific studies.

The New Granadan Caldas espoused this view when he savoured the dizzying array of 'aromas, balsams, precious woods, different palms, medicinal herbs, unknown flowers, colourful birds, bands of animals, numerous families of monkeys, different amphibians, useful insects and venomous reptiles' that 'call the attention of naturalists' in his bountiful homeland.⁴ The Mexican Alzate, meanwhile, questioned 'what new knowledge we have acquired after so many botanical expeditions'. He sneered that 'to overload the memory with the names of plants whose uses and properties are unknown is no better than to imitate those who seek to adorn their cabinets with Chinese pictures of arbitrary plants and flowers, that serve as nothing more than a simple decoration'.⁵

Prior to independence, such sentiments represented a latent resentment of Spanish imperialism, pride in the diversity of American nature and a tacit recognition of the links between scientific authority and imperial power. They did not necessarily preclude collaboration with the imperial authorities in the collection of specimens.

⁴ Caldas, 'Estado de la Geografía del Virreinato de Santafé de Bogotá, con relación a la economía y al comercio', in *Obras*, p.191

⁵ 'Carta satisfactoria', p.95

Nor did they preclude a broader, collective pride in the intellectual achievements of the Hispanic world.

After independence, these views unsurprisingly blossomed into a more virulent critique of Spanish imperialism, as Americans disowned their colonial past. Creoles minimised Spain's contribution to the sciences, presenting independence as a watershed for scientific development in their respective nations. They perpetuated the image of Spain as a barbarous and neglectful colonial master and predicted great scientific progress now that America had shrugged off the Spanish yoke.

In reality, however, independence was not a panacea for all scientific ills, for whilst it released Americans from the constraints of Spanish rule, it also dissolved existing scholarly projects. The protracted wars of liberation interrupted and often permanently halted botanical surveys, many of which remained incomplete and unpublished. They severed important ties with Europe, and, perhaps most damagingly, they claimed the lives of some of America's best naturalists, extinguishing savants whose expertise would be difficult to replace.

Emblematic of this dismal state of affairs is the fate of Caldas, who was apprehended by royalist troops in 1816 for his part in the insurrection. Sentenced to death by the Spaniards, the New Granadan appealed to General Enrile for clemency. He snivelled that his many scientific works would 'perish with their author' if the latter did not show mercy towards this 'unfortunate astronomer', and he repented unreservedly for his flirtation with the revolution, downplaying his role in the insurgency and presenting himself as an innocent bystander who had let himself be 'carried away by this contagious torrent', but had refrained from the worst acts of insubordination. 'Always pacific, a friend of the sciences and their ardent cultivator, I have always loved work and seclusion', whimpered Caldas, 'and I have laid the

foundations for many original works that would have honoured the Botanical Expedition on which they depended...if the political turmoil had not come to disturb my peace'.⁶

Enrile and his superior Morillo were unmoved by these pathetic pleas and ordered Caldas' execution. In so doing, they snuffed out a promising career. They also retarded scientific development in nineteenth-century Colombia by eliminating an exceptional scholar who could not easily be replaced. 'The day of 30 October 1816, in which the blade of the Spanish General Morillo deprived Caldas of his life, tropical nature was covered with a funereal veil', sentimentalised Joaquín Acosta, 'and since that sad era the patria has not been able to replace this worthy son'. 'More than thirty years have passed, and his place is still vacant, in spite of the progress that the sciences have made since then in the world...Shame and eternal ignominy to those barbarians who made him perish before a firing squad simply because he was a savant and a patriot!'⁷ The Bourbon quest to regenerate Spain's imperial glories by a conquest of nature had, it seems, regressed to older, more primitive means of asserting imperial authority and securing colonial co-operation.

⁶ Letter from Caldas to Pascual Enrile, 27 October 1816, in *Cartas de Caldas*, pp.355-357

⁷ Acosta, 'Breve Noticia', p.x

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